



Edward Peake
C of E (VC) Middle School

Mathematics Department

“Encourage each other and build each other up” (Thessalonians 5:11)

Year 8 Home Study Pack

- Lessons and activities are available on the Year 8 google classroom
 - Students should use Maths Whizz for at least 1 hour a week
- If students are stuck they should use the stream on the google classroom. This will be checked regularly between 9:00 am and 3:00 pm on school days during term time

The class code is: gta2act

Pack 2 : Summer Term 1

Use this space for your
KEY SKILLS workings!



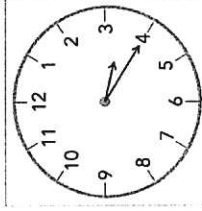
WEEK 3 SESSION 2 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$20 + \square = 20$	
2	Double 53	
3	$51 + 10$	
4	$100 - 10$	
5	$8 = 4 + \square$	
6	$70 - 11 = 70 - 10 - \square$	
7	$7 + 7 + 7 + 7 = \square \times 7$	
8	What is the time on the clock? pm	
9	$1 + \square = 10$	
10	$66 + 34$	
Total out of 10		



Q	Question	Answer																														
1	$271 + 8501$																															
2	$(8 - 2)^2 + 3 \times 4$																															
3	Write 4335000 in words. (Use the opposite page for your answer)																															
4	$0.8 + 100$																															
5	$(-1) \times (-9)$																															
6	Round 61.9361 to 3 d.p.																															
7	$(-7) + (-4)$																															
8	Round 3096 to 1 s.f.																															
9	Letter at (-1, 1) <table style="font-size: small; margin-left: 20px;"> <tr><td>x</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr> <tr><td>y</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td></tr> <tr><td></td><td>K</td><td>L</td><td>M</td><td>N</td><td>P</td></tr> <tr><td></td><td>Q</td><td>R</td><td>S</td><td>T</td><td>U</td></tr> <tr><td></td><td>V</td><td>W</td><td>X</td><td>Y</td><td>Z</td></tr> </table>	x	A	B	C	D	E	y	F	G	H	I	J		K	L	M	N	P		Q	R	S	T	U		V	W	X	Y	Z	
x	A	B	C	D	E																											
y	F	G	H	I	J																											
	K	L	M	N	P																											
	Q	R	S	T	U																											
	V	W	X	Y	Z																											
10	$7/5 = 35/\square$																															
Total out of 10																																

What's your **NINJA** Score?

Fill in your scores in the boxes
and calculate it now!



MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +

MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 3 SESSION 3 - Answer as many questions as you can in 5 mins

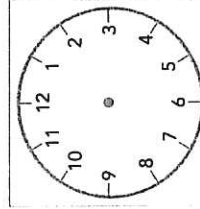
MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 5 = 20$	
2	What is double 39?	
3	$65 + 10$	
4	$179 - 10$	
5	$6 = 2 + \square$	
6	$12 - 6 = 12 - 2 - \square$	
7	$86 = \square \times 86$	
8	Draw hands on the clock face showing 4:45 pm	
9	$\square + 8 = 10$	
10	$57 + 43$	
Total out of 10		

Q	Question	Answer
1	$2 \times 6 = \square$	
2	$24 + 8 = \square$	
3	$9 \times \square = 81$	
4	$18 \div \square = 6$	
5	$4 \times 6 = \square$	
6	$6 + 1 = \square$	
7	$\square \times 4 = 28$	
8	$\square \div 6 = 2$	
9	$8 \times 2 = \square$	
10	$5 + 1 = \square$	
Total out of 10		



Q	Question	Answer
1	$32 + 211$	
2	$3^2 + 2 \times 2$	
3	Write 6481504 in words. (Use the opposite page for your answer)	
4	$9.47 + 10$	
5	$(-8) \times (-8)$	
6	Round 48.2994 to 3 d.p.	
7	$(-6) + (-10)$	
8	Round 34 to 3 s.f.	
9	Letter at (-1, 1) $\begin{matrix} y \\ A & B & C & D & E \\ F & G & H & I & J \\ K & L & M & N & P & Q \\ R & S & T & U \\ V & W & X & Y & Z \end{matrix}$	
10	$4/2 = 8/\square$	
Total out of 10		

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KEY SKILLS: +



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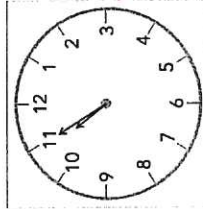
WEEK 3 SESSION 4 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
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KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$13 + 7$	
2	Double 25	
3	$103 + 10$	
4	$165 - 80$	
5	$9 = 1 + \square$	
6	$44 - 8 = 44 - 4 - \square$	
7	$84 + 84 = 84 \times \square$	
8	What is the time on the clock? pm	
9	$2 + 8$	
10	$\square + 83 = 100$	
Total out of 10		



Q	Question	Answer
1	$4677 + 507$	
2	$(102 - 2) + 10$	
3	Write 963206 in words. (Use the opposite page for your answer)	
4	$0.27 + 10$	
5	$2 \times (-2)$	
6	Round 96.2442 to 2 d.p.	
7	$10 + (-10)$	
8	Round 0.1535 to 1 s.f.	
9	Letter at (1, 1) x y A B C D E F G H I J K L M N P Q R S T U V W X Y Z	
10	$10/10 = \square/40$	
Total out of 10		

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MENTAL STRATEGIES:

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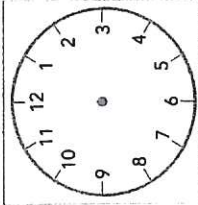
WEEK 3 SESSION 5 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$3 + 17$	
2	What is double 55?	
3	$112 + 10$	
4	$29 - 10$	
5	$6 = 1 + \square$	
6	$58 - 11 = 58 - 8 - \square$	
7	$73 + 73 = \square \times 73$	
8	Draw hands on the clock face showing 10:10 am	
9	$7 + 3$	
10	$\square + 46 = 100$	
Total out of 10		



Q	Question	Answer
1	$6 \times 7 = \square$	
2	$24 \div 4 = \square$	
3	$4 \times \square = 28$	
4	$24 \div \square = 4$	
5	$7 \times 6 = \square$	
6	$18 \div 6 = \square$	
7	$\square \times 4 = 4$	
8	$\square \div 2 = 3$	
9	$5 \times 7 = \square$	
10	$54 \div 6 = \square$	
Total out of 10		

Q	Question	Answer
1	$481 + 1429$	
2	$(9 - 5)^2 + 3 \times 4$	
3	Write One Thousand and Thirty Two in digits	
4	$0.35 + 100$	
5	$(-6) \times (-10)$	
6	Round 81,4358 to 2 d.p.	
7	$(-5) + (-5)$	
8	Round 21 to 2 s.f.	
9	Letter at (0, -1) y	
	A - B - C - D - E F - G - H - I - J K - L - M - N - P - Q R - S - T - U V - W - X - Y - Z	
10	$1/4 = 3/4$	
Total out of 10		

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WEEK 4 SESSION 1 - Answer as many questions as you can in 5 mins

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TIMESTABLES -
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KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$3 + 2$	
2	$\square + 25 = 100$	
3	What is half of 8?	
4	$150 - 10$	
5	$191 + \square = 210$	
6	$97 = 60 + \square$	
7	$135 - 132$	
8	$5 \times 8 = 40$, so $40 + 5 = \square$	
9	Write 20:11 in 12 hour clock format	
10	07:52 is how many minutes after 07:06?	
Total out of 10		

Q	Question	Answer
1	$2 \times 7 = \square$	
2	$6 + 3 = \square$	
3	$3 \times \square = 21$	
4	$56 + \square = 8$	
5	$10 \times 9 = \square$	
6	$30 + 10 = \square$	
7	$\square \times 4 = 16$	
8	$\square + 9 = 6$	
9	$10 \times 8 = \square$	
10	$90 + 10 = \square$	
Total out of 10		

Q	Question	Answer
1	What is $\frac{3}{9}$ of 54?	
2	964×9	
3	$1444 - 982$	
4	3.2×8.25	
5	$\frac{8}{10}$ as a decimal number	
6	$82.23 + 7.27$	
7	$36 \div (-6)$	
8	If $a = 1$, $b = 3$ and $c = 4$, what is the value of $4b^3$?	
9	$10 - (-9)$	
10	Is 5 a factor of 21?	
Total out of 10		

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WEEK 4 SESSION 2 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
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TIMESTABLES -
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KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$2 + \square = 5$	
2	$54 + 46$	
3	Halve 6	
4	$184 - 10$	
5	$91 + \square = 150$	
6	$83 = 60 + \square$	
7	$931 - 926$	
8	$9 \times 5 = 45$, so $45 \div 5 = \square$	
9	Write 8:13 am in 24 hour clock format	
10	From 2:46 am, how many minutes until 3:22 am?	
Total out of 10		

Q	Question	Answer
1	$10 \times 10 = \square$	
2	$8 + 8 = \square$	
3	$5 \times \square = 40$	
4	$20 + \square = 5$	
5	$9 \times 8 = \square$	
6	$80 \div 8 = \square$	
7	$\square \times 6 = 18$	
8	$\square \div 7 = 10$	
9	$2 \times 8 = \square$	
10	$12 \div 6 = \square$	
Total out of 10		

Q	Question	Answer
1	What is $\frac{1}{3}$ of 12?	
2	6×225	
3	$6543 - 5498$	
4	9.8×4.8	
5	100% as a decimal number	
6	$1.23 + 46.27$	
7	$(-24) \div (-3)$	
8	If $a = 7$, $b = 7$ and $c = 2$, what is the value of $ac \div 2b$?	
9	$(-3) - (-7)$	
10	What is the highest common factor of 23 and 20?	
Total out of 10		

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WEEK 4 SESSION 3 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
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TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$2 + \square = 5$	
2	$4 + 96$	
3	What is half of 3?	
4	$80 - 10$	
5	$40 + \square = 130$	
6	$81 = 70 + \square$	
7	$722 - 719$	
8	$6 \times 2 = 12$, so $12 + 6 = \square$	
9	Write 5:56 pm in 24 hour clock format	
10	From 8:13 am, how many minutes until 9:13 am?	
Total out of 10		

Q	Question	Answer
1	$5 \times 3 = \square$	
2	$49 + 7 = \square$	
3	$8 \times \square = 64$	
4	$5 + \square = 5$	
5	$10 \times 8 = \square$	
6	$12 + 6 = \square$	
7	$\square \times 9 = 54$	
8	$\square + 7 = 7$	
9	$7 \times 6 = \square$	
10	$7 + 7 = \square$	
Total out of 10		

Q	Question	Answer
1	What is 5/7 of 63?	
2	7×498	
3	$15939 - 9001$	
4	6.63×7	
5	89.9% as a decimal number	
6	$85.83 + 9.4$	
7	$(-30) + (-10)$	
8	If $a = 8$ $b = 7$ and $c = 7$, what is the value of $\sqrt[3]{a + bc}$?	
9	$(-10) - (-6)$	
10	What is the highest common factor of 8 and 2?	
Total out of 10		

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MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +

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WEEK 4 SESSION 4 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$3 + 2$	
2	$\square + 80 = 100$	
3	What is half of 4?	
4	$84 - 10$	
5	$122 + \square = 200$	
6	$82 = 12 + \square$	
7	$588 - 585$	
8	$8 \times 9 = 72$, so $72 \div 8 = \square$	
9	Write 05:53 in 12 hour clock format	
10	1:46 pm is how many minutes after 1:30 pm?	
Total out of 10		

Q	Question	Answer
1	$5 \times 10 = \square$	
2	$42 \div 6 = \square$	
3	$8 \times \square = 24$	
4	$10 \div \square = 1$	
5	$8 \times 9 = \square$	
6	$8 \div 8 = \square$	
7	$\square \times 4 = 16$	
8	$\square \div 7 = 7$	
9	$1 \times 9 = \square$	
10	$70 \div 10 = \square$	
Total out of 10		

Q	Question	Answer
1	What is $\frac{4}{10}$ of 20?	
2	489×5	
3	$14704 - 8633$	
4	6.1×80.09	
5	70% as a fraction	
6	$0.41 + 61.21$	
7	$(-40) \div (-5)$	
8	If $a = 6$, $b = 6$ and $c = 10$, what is the value of $2abc - c^2$	
9	$(-6) - (-6)$	
10	Is 7 a factor of 24?	
Total out of 10		

What's your NINJA Score?
Fill in your scores in the boxes
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MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +

MY NINJA BELT:

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WEEK 4 SESSION 5 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 3 = 5$	
2	$68 + \square = 100$	
3	What is half of 4?	
4	$189 - 10$	
5	$161 + \square = 240$	
6	$74 = 24 + \square$	
7	$629 - 627$	
8	$9 \times 5 = 45$, so $45 + 9 = \square$	
9	Write 8:23 am in 24 hour clock format	
10	2:15 pm is how many minutes after 2:05 pm?	
Total out of 10		

Q	Question	Answer
1	$5 \times 1 = \square$	
2	$24 + 8 = \square$	
3	$5 \times \square = 30$	
4	$45 + \square = 9$	
5	$6 \times 1 = \square$	
6	$40 + 4 = \square$	
7	$\square \times 1 = 10$	
8	$\square + 3 = 9$	
9	$6 \times 4 = \square$	
10	$2 + 2 = \square$	
Total out of 10		

Q	Question	Answer
1	What is $\frac{4}{6}$ of 30?	
2	3×911	
3	$16071 - 8966$	
4	6.9×5.85	
5	$\frac{8}{10}$ as a decimal number	
6	$23.8 + 0.55$	
7	$(-18) \div 9$	
8	If $a = 6$, $b = 8$ and $c = 4$, what is the value of $(2b/c)^2$?	
9	$(-1) - (-3)$	
10	Is 1 a factor of 3?	
Total out of 10		

What's your **NINJA** Score?
Fill in your scores in the boxes
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MENTAL
STRATEGIES:

TIMESTABLES:

KEY SKILLS:

+

MY **NINJA** BELT:

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WEEK 5 SESSION 1 - Answer as many questions as you can in 5 mins

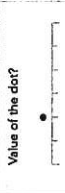
MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 9 = 10$	
2	What is double 6?	
3	Halve 24	
4	$143 + 60$	
5	$94 + 97$	
6	$41 + 10 = 41 + \square$	
7	$1 + 700$	
8	$31 + 47 = 30 + 40 + \square$	
9	What is double 56?	
10	What is half of 4?	
Total out of 10		

Q	Question	Answer
1	$7 \times 10 = \square$	
2	$21 + 3 = \square$	
3	$3 \times \square = 18$	
4	$5 + \square = 1$	
5	$1 \times 2 = \square$	
6	$30 + 3 = \square$	
7	$\square \times 2 = 8$	
8	$\square \div 3 = 6$	
9	$3 \times 6 = \square$	
10	$63 \div 7 = \square$	
Total out of 10		

Q	Question	Answer
1	What is 25% of £190?	
2	$6146 + 7$	
3	$4 + 5 \times 1$	
4	$462.2 \div 5$	
5	1000×0.64	
6	$69.12 - 9.2$	
7	Write $35/49$ in its simplest form	
8	$10 - 10$	
9	Value of the dot? 	
10	What is the lowest common multiple of 6 and 8?	
Total out of 10		

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MENTAL STRATEGIES:

TIMESTABLES:

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+

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WEEK 5 SESSION 2 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
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TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 5 = 10$	
2	What is double 7?	
3	Halve 57	
4	$93 + 30$	
5	$82 + 84$	
6	$87 + 11 = 87 + \square$	
7	$1 + 487$	
8	$14 + 40 = 14 + 40 + \square$	
9	What is double 79?	
10	What is half of 7?	
Total out of 10		

Q	Question	Answer
1	$2 \times 2 = \square$	
2	$9 + 3 = \square$	
3	$8 \times \square = 16$	
4	$35 + \square = 5$	
5	$2 \times 1 = \square$	
6	$10 \div 2 = \square$	
7	$\square \times 6 = 48$	
8	$\square \div 8 = 6$	
9	$9 \times 3 = \square$	
10	$70 \div 7 = \square$	
Total out of 10		

Q	Question	Answer
1	What is 45% of £140?	
2	$3996 \div 4$	
3	$5 + 10 \times 3$	
4	$7.474 \div 0.2$	
5	0.939×1000	
6	$96.54 - 8.01$	
7	Simplify $2/18$	
8	Difference between -10 and 9	
9	Value of the dot? 	
10	What is the lowest common multiple of 7 and 8?	
Total out of 10		

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MENTAL STRATEGIES:

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WEEK 5 SESSION 3 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

Q	Question	Answer
1	$9 + 1$	
2	What is double 3?	
3	Halve 94	
4	$44 + 40$	
5	$20 + 23$	
6	$83 + 10 = 83 +$ $7 + \square$	
7	$5 + 695$	
8	$46 + 56 = 40 +$ $50 + \square$	
9	Double 25	
10	What is half of 5?	
Total out of 10		

TIMESTABLES -
do these in your head

Q	Question	Answer
1	$10 \times 10 = \square$	
2	$28 + 7 = \square$	
3	$8 \times \square = 16$	
4	$40 + \square = 4$	
5	$7 \times 1 = \square$	
6	$56 \div 8 = \square$	
7	$\square \times 8 = 32$	
8	$\square \div 4 = 9$	
9	$9 \times 2 = \square$	
10	$6 + 1 = \square$	
Total out of 10		

KEY SKILLS - you may use written calculations for these questions

Q	Question	Answer
1	What is 10% of £200?	
2	$1386 + 3$	
3	$8 + 2 + 1$	
4	$47.915 + 0.5$	
5	100×88.255	
6	$51 - 1.02$	
7	Write $\frac{9}{18}$ in its simplest form	
8	Which is the lowest number, -7 or -4?	
9	Value of the dot? 	
10	What is the lowest common multiple of 5 and 6?	
Total out of 10		

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WEEK 5 SESSION 4 - Answer as many questions as you can in 5 mins

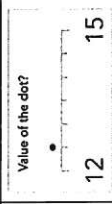
MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 5 = 10$	
2	Double 9	
3	What is half of 59?	
4	$71 + 60$	
5	$98 + 99$	
6	$73 + 8 = 73 + 7 + \square$	
7	$5 + 712$	
8	$25 + 60 = 20 + 60 + \square$	
9	What is double 40?	
10	Halve 3	
Total out of 10		

Q	Question	Answer
1	$3 \times 7 = \square$	
2	$80 + 10 = \square$	
3	$3 \times \square = 15$	
4	$4 + \square = 1$	
5	$8 \times 6 = \square$	
6	$40 + 4 = \square$	
7	$\square \times 8 = 8$	
8	$\square + 10 = 9$	
9	$2 \times 2 = \square$	
10	$2 + 2 = \square$	
Total out of 10		

Q	Question	Answer
1	What is 5% of £100?	
2	$5292 + 7$	
3	$90 - 4 + 4$	
4	$15.22 + 0.2$	
5	6.16×100	
6	$32.68 - 3.54$	
7	Write $24/80$ in its simplest form	
8	Difference between 6 and -3	
9	Value of the dot? 	
10	List the first 4 multiples of 12	
Total out of 10		

What's your **NINJA** Score?
Fill in your scores in the boxes
and calculate it now!

MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +



MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 5 SESSION 5 - Answer as many questions as you can in 5 mins

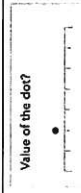
MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 7 = 10$	
2	What is double 9?	
3	Halve 40	
4	$111 + 30$	
5	$66 + 63$	
6	$17 + 9 = 17 + 3 + \square$	
7	$3 + 468$	
8	$33 + 70 = 30 + 70 + \square$	
9	Double 58	
10	What is half of 7?	
Total out of 10		

Q	Question	Answer
1	$6 \times 2 = \square$	
2	$36 \div 6 = \square$	
3	$5 \times \square = 15$	
4	$56 \div \square = 7$	
5	$3 \times 9 = \square$	
6	$5 + 5 = \square$	
7	$\square \times 9 = 9$	
8	$\square \div 6 = 3$	
9	$8 \times 3 = \square$	
10	$18 \div 3 = \square$	
Total out of 10		

Q	Question	Answer
1	What is 125% of £150?	
2	$1710 \div 5$	
3	$85 - 15 \div 5$	
4	$28.82 + 0.5$	
5	71.204×100	
6	$25 - 1.33$	
7	Simplify $\frac{6}{60}$	
8	Which is the lowest number, -4 or -3?	
9	Value of the dot? 	
10	List the first 4 multiples of 11	
Total out of 10		

What's your NINJA Score?
Fill in your scores in the boxes
and calculate it now!



MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +

MY NINJA BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 6 SESSION 1 - Answer as many questions as you can in 5 mins

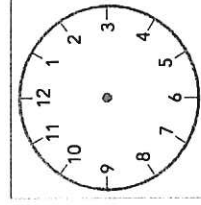
MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$17 + \square = 20$	
2	What is double 36?	
3	$89 + 10$	
4	$143 - 20$	
5	$5 = 4 + \square$	
6	$14 - 7 = 14 - 4 - \square$	
7	$56 + 56 = \square \times 56$	
8	Draw hands on the clock face showing 7:05 pm	
9	What is double 9?	
10	Halve 48	
Total out of 10		

Q	Question	Answer
1	$5 \times 10 = \square$	
2	$18 + 6 = \square$	
3	$9 \times \square = 63$	
4	$32 + \square = 4$	
5	$5 \times 9 = \square$	
6	$3 + 3 = \square$	
7	$\square \times 3 = 24$	
8	$\square + 3 = 10$	
9	$1 \times 3 = \square$	
10	$10 + 5 = \square$	
Total out of 10		



Q	Question	Answer
1	What is the value of (-15) squared?	
2	$986 + 3175$	
3	$\sqrt{64 + 8 + 8}$	
4	Write 780026 in words. (Use the opposite page for your answer)	
5	$13.089 + 1000$	
6	$(-1) \times (-6)$	
7	Round 6.5254 to 2 d.p.	
8	$10 + (-5)$	
9	Round 0.006435 to 1 s.f.	
10	Letter at (-2, -2) A-B-C-D-E F-G-H-I-J K-L-M-N-P-Q R-S-T-U V-W-X-Y-Z	
Total out of 10		

What's your **NINJA** Score?
Fill in your scores in the boxes
and calculate it now!

MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +



MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



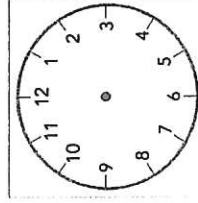
WEEK 6 SESSION 2 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$8 + \square = 20$	
2	Double 49	
3	$69 + 10$	
4	$196 - 80$	
5	$6 = 3 + \square$	
6	$53 - 8 = 53 - 3 - \square$	
7	$9 = 9 \times \square$	
8	Draw hands on the clock face showing quarter to nine	
9	What is double 8?	
10	Halve 14	
Total out of 10		



Q	Question	Answer
1	$8 \times 1 = \square$	
2	$28 + 4 = \square$	
3	$2 \times \square = 6$	
4	$28 + \square = 4$	
5	$4 \times 6 = \square$	
6	$6 \div 3 = \square$	
7	$\square \times 2 = 8$	
8	$\square \div 7 = 8$	
9	$8 \times 8 = \square$	
10	$80 \div 10 = \square$	
Total out of 10		

Q	Question	Answer
1	What is the value of 15 squared?	
2	$3530 + 6819$	
3	$(8 - 2) \times 2$	
4	Write Twenty Four Thousand, Three Hundred in digits	
5	$43,537 + 100$	
6	$(-8) \times 1$	
7	Round 22,7383 to 1 d.p.	
8	$2 + (-7)$	
9	Round 275 to 1 s.f.	
10	Letter at (2, 1) A-B-C-D-E F-G-H-I-J K-L-M-N-P-Q R-S-T-U V-W-X-Y-Z	
Total out of 10		

What's your **NINJA** Score?

Fill in your scores in the boxes
and calculate it now!



MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +

MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



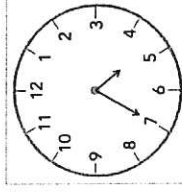
WEEK 6 SESSION 3 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$11 + \square = 20$	
2	What is double 34?	
3	$193 + 10$	
4	$140 - 50$	
5	$4 = 1 + \square$	
6	$19 - 11 = 19 - \square$	
7	$14 + 14 + 14 = \square \times 14$	
8	What is the time on the clock? am	
9	What is double 8?	
10	What is half of 72?	
Total out of 10		



Q	Question	Answer
1	$7 \times 4 = \square$	
2	$1 + 1 = \square$	
3	$10 \times \square = 100$	
4	$90 + \square = 10$	
5	$8 \times 8 = \square$	
6	$30 + 5 = \square$	
7	$\square \times 10 = 10$	
8	$\square + 8 = 7$	
9	$4 \times 9 = \square$	
10	$4 + 4 = \square$	
Total out of 10		

Q	Question	Answer
1	What is the positive value of $\sqrt{16}$?	
2	$224 + 9070$	
3	$(7 + 1) \times 3$	
4	Write Four Hundred and Sixty Two in digits	
5	$59.742 + 10$	
6	$(-7) \times (-4)$	
7	Round 0.9451 to 2 d.p.	
8	$2 + (-2)$	
9	Round 0.8243 to 3 s.f.	
10	Letter at (-1, 1) Y C D E H I J K L M N P Q R S T U V W X Y Z	
Total out of 10		

What's your NINJA Score?

Fill in your scores in the boxes and calculate it now!

MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS:

+

MY NINJA BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



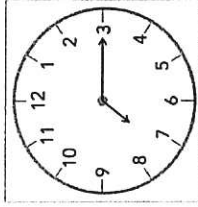
WEEK 6 SESSION 4 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 17 = 20$	
2	Double 66	
3	$95 + 10$	
4	$25 - 20$	
5	$6 = 4 + \square$	
6	$66 - 10 = 66 - \square$	
7	$9 = 9 \times \square$	
8	What is the time on the clock? pm	
9	Double 5	
10	What is half of 59?	
Total out of 10		



Q	Question	Answer
1	$4 \times 3 = \square$	
2	$12 + 4 = \square$	
3	$5 \times \square = 25$	
4	$10 \div \square = 2$	
5	$4 \times 7 = \square$	
6	$14 + 2 = \square$	
7	$\square \times 8 = 80$	
8	$\square + 1 = 3$	
9	$5 \times 6 = \square$	
10	$18 + 2 = \square$	
Total out of 10		

Q	Question	Answer
1	What is the positive value of $\sqrt{25}$?	
2	$1668 + 2809$	
3	$(10 - 10)^2 + 3 \times 2$	
4	Write Ten Thousand, Nine Hundred in digits	
5	$62,487 + 1000$	
6	$2 \times (-7)$	
7	Round 45.4952 to 3 d.p.	
8	$(-4) + (-3)$	
9	Round 0.002734 to 3 s.f.	
10	Letter at (2, -2) A B C D E F G H I J K L M N P Q R S T U V W X Y Z	
Total out of 10		

What's your **NINJA** Score?
Fill in your scores in the boxes
and calculate it now!



MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +

MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



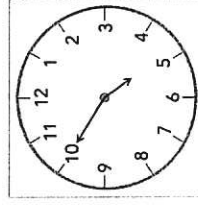
WEEK 6 SESSION 5 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$1 + \square = 20$	
2	Double 54	
3	$22 + 10$	
4	$44 - 40$	
5	$7 = 2 + \square$	
6	$75 - 11 = 75 - \square$	
7	$6 + 6 + 6 + 6 + 6 = 6 \times \square$	
8	What is the time on the clock? pm	
9	Double 7	
10	What is half of 44?	
Total out of 10		



Q	Question	Answer
1	$6 \times 6 = \square$	
2	$2 + 2 = \square$	
3	$6 \times \square = 12$	
4	$40 + \square = 5$	
5	$1 \times 9 = \square$	
6	$40 + 8 = \square$	
7	$\square \times 7 = 49$	
8	$\square + 3 = 1$	
9	$2 \times 2 = \square$	
10	$48 + 6 = \square$	
Total out of 10		

Q	Question	Answer
1	What is the value of 11?	
2	$7905 + 626$	
3	$(10 - 9) \times 1$	
4	Write 744620 in words. (Use the opposite page for your answer)	
5	$0.67 + 100$	
6	$3 \times (-1)$	
7	Round 1.982 to 2 d.p.	
8	$(-3) + (-6)$	
9	Round 0.2352 to 3 s.f.	
10	Letter at (0, 1) A-B-C-D-E F-G-H-I-J K-L-M-N-P-X Q-R-S-T-U V-W-X-Y-Z	
Total out of 10		

What's your **NINJA** Score?
Fill in your scores in the boxes
and calculate it now!

MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +



MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 7 SESSION 1 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$4 + 1$	
2	$66 + \square = 100$	
3	What is half of 6?	
4	$122 - 10$	
5	$56 + \square = 90$	
6	$56 = 26 + \square$	
7	$199 - 194$	
8	$10 \times 5 = 50$, so $50 + 10 = \square$	
9	Write 2:15 pm in 24 hour clock format	
10	From 15:09, how many minutes until 15:30?	
Total out of 10		

Q	Question	Answer
1	$9 \times 5 = \square$	
2	$60 + 6 = \square$	
3	$2 \times \square = 16$	
4	$10 + \square = 1$	
5	$9 \times 10 = \square$	
6	$12 + 2 = \square$	
7	$\square \times 5 = 20$	
8	$\square + 4 = 6$	
9	$8 \times 3 = \square$	
10	$18 + 6 = \square$	
Total out of 10		

Q	Question	Answer
1	List all the factors of 2	
2	What is $\frac{1}{2}$ of 8?	
3	65×38	
4	$11661 - 7509$	
5	8.2×3.5	
6	173.2% as a decimal number	
7	$13 + 4.5$	
8	$40 + (-10)$	
9	If $a = 4$, $b = 5$ and $c = 7$, what is the value of $3b - 2a$?	
10	$7 - (-5)$	
Total out of 10		

What's your **NINJA** Score?

Fill in your scores in the boxes
and calculate it now!



MENTAL
STRATEGIES:

TIMESTABLES:

KEY SKILLS:

MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 7 SESSION 2 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

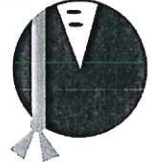
Q	Question	Answer
1	$3 + 2$	
2	$75 + \square = 100$	
3	Halve 2	
4	$159 - 10$	
5	$61 + \square = 130$	
6	$96 = 60 + \square$	
7	$712 - 711$	
8	$1 \times 9 = 9$, so $9 + 1 = \square$	
9	Write 17:39 in 12 hour clock format	
10	From 01:49, how many minutes until 02:29?	
Total out of 10		

Q	Question	Answer
1	$2 \times 6 = \square$	
2	$28 + 7 = \square$	
3	$4 \times \square = 36$	
4	$24 + \square = 4$	
5	$6 \times 7 = \square$	
6	$8 \div 8 = \square$	
7	$\square \times 8 = 40$	
8	$\square \div 2 = 7$	
9	$3 \times 8 = \square$	
10	$8 + 8 = \square$	
Total out of 10		

Q	Question	Answer
1	What is the highest common factor of 11 and 3?	
2	What is $\frac{4}{5}$ of 5?	
3	5×666	
4	$18897 - 9897$	
5	4.61×5	
6	17% as a decimal number	
7	$11 + 8.69$	
8	$(-8) + 2$	
9	If $a = 2$, $b = 2$ and $c = 8$, what is the value of $ac^2 + 2$?	
10	$6 - (-8)$	
Total out of 10		

What's your **NINJA** Score?

Fill in your scores in the boxes
and calculate it now!



MENTAL STRATEGIES:

TIMESTABLES:

KEY SKILLS: +

MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 7 SESSION 3 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$1 + \square = 5$	
2	$\square + 58 = 100$	
3	Halve 7	
4	$158 - 10$	
5	$91 + \square = 180$	
6	$114 = 24 + \square$	
7	$104 - 100$	
8	$2 \times 8 = 16$, so $16 \div 8 = \square$	
9	Write 02:29 in 12 hour clock format	
10	4:14 pm is how many minutes after 3:56 pm?	
Total out of 10		

Q	Question	Answer
1	$2 \times 3 = \square$	
2	$18 \div 2 = \square$	
3	$3 \times \square = 15$	
4	$20 + \square = 5$	
5	$2 \times 3 = \square$	
6	$70 \div 7 = \square$	
7	$\square \times 2 = 2$	
8	$\square \div 3 = 5$	
9	$6 \times 9 = \square$	
10	$6 \div 3 = \square$	
Total out of 10		

Q	Question	Answer
1	What is the highest common factor of 24 and 4?	
2	What is $\frac{4}{6}$ of 6?	
3	549×4	
4	$6062 - 3640$	
5	8.7×85.92	
6	$0.83 = \square\%$	
7	$11 + 1.14$	
8	$(-30) \div (-5)$	
9	If $a = 10$, $b = 6$ and $c = 4$, what is the value of $3b - (a + c)$?	
10	$4 - (-2)$	
Total out of 10		

What's your NINJA Score?

Fill in your scores in the boxes
and calculate it now!

MENTAL
STRATEGIES:

TIMESTABLES:

KEY SKILLS:

+

MY NINJA BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 7 SESSION 4 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$4 + 1$	
2	$\square + 78 = 100$	
3	Halve 6	
4	$165 - 10$	
5	$116 + \square = 130$	
6	$66 = 20 + \square$	
7	$186 - 182$	
8	$7 \times 5 = 35$, so $35 + 5 = \square$	
9	Write 12:10 pm in 24 hour clock format	
10	1:57 am is how many minutes after 1:13 am?	
Total out of 10		

Q	Question	Answer
1	$3 \times 4 = \square$	
2	$36 \div 9 = \square$	
3	$8 \times \square = 80$	
4	$15 \div \square = 5$	
5	$6 \times 1 = \square$	
6	$16 \div 8 = \square$	
7	$\square \times 10 = 60$	
8	$\square + 10 = 3$	
9	$3 \times 3 = \square$	
10	$24 + 4 = \square$	
Total out of 10		

Q	Question	Answer
1	Is 10 a factor of 36?	
2	What is $2/4$ of 4?	
3	2×344	
4	$18797 - 9492$	
5	5×1.6	
6	$0.56 = \square\%$	
7	$15 + 0.47$	
8	$12 \div (-4)$	
9	If $a = 1$, $b = 4$ and $c = 9$, what is the value of $c^2 - b^3$	
10	$(-10) - (-9)$	
Total out of 10		

What's your **NINJA** Score?

Fill in your scores in the boxes
and calculate it now!

MENTAL
STRATEGIES:

TIMESTABLES:

KEY SKILLS:

+

MY **NINJA** BELT:

NINJA SCORE:

Use this space for your
KEY SKILLS workings!



WEEK 7 SESSION 5 - Answer as many questions as you can in 5 mins

MENTAL STRATEGIES -
do these in your head

TIMESTABLES -
do these in your head

KEY SKILLS - you may use written calculations
for these questions

Q	Question	Answer
1	$\square + 3 = 5$	
2	$15 + 85$	
3	Halve 2	
4	$196 - 10$	
5	$188 + \square = 260$	
6	$62 = 32 + \square$	
7	$604 - 601$	
8	$8 \times 4 = 32$, so $32 \div 4 = \square$	
9	Write 05:48 in 12 hour clock format	
10	From 22:06, how many minutes until 22:28?	
Total out of 10		

Q	Question	Answer
1	$4 \times 4 = \square$	
2	$8 + 4 = \square$	
3	$8 \times \square = 16$	
4	$5 + \square = 1$	
5	$6 \times 8 = \square$	
6	$9 \div 3 = \square$	
7	$\square \times 6 = 24$	
8	$\square + 2 = 10$	
9	$7 \times 6 = \square$	
10	$70 \div 10 = \square$	
Total out of 10		

Q	Question	Answer
1	What is the highest common factor of 29 and 22?	
2	What is $\frac{3}{4}$ of 40?	
3	6×564	
4	$14786 - 8106$	
5	9.4×7.4	
6	$\frac{2}{10}$ as a decimal number	
7	$34.53 + 6.2$	
8	$(-1) + 1$	
9	If $a = 4$, $b = 1$ and $c = 2$, what is the value of $3a / 2$?	
10	$1 - (-2)$	
Total out of 10		

What's your **NINJA** Score?
Fill in your scores in the boxes
and calculate it now!



MENTAL
STRATEGIES:

TIMESTABLES:

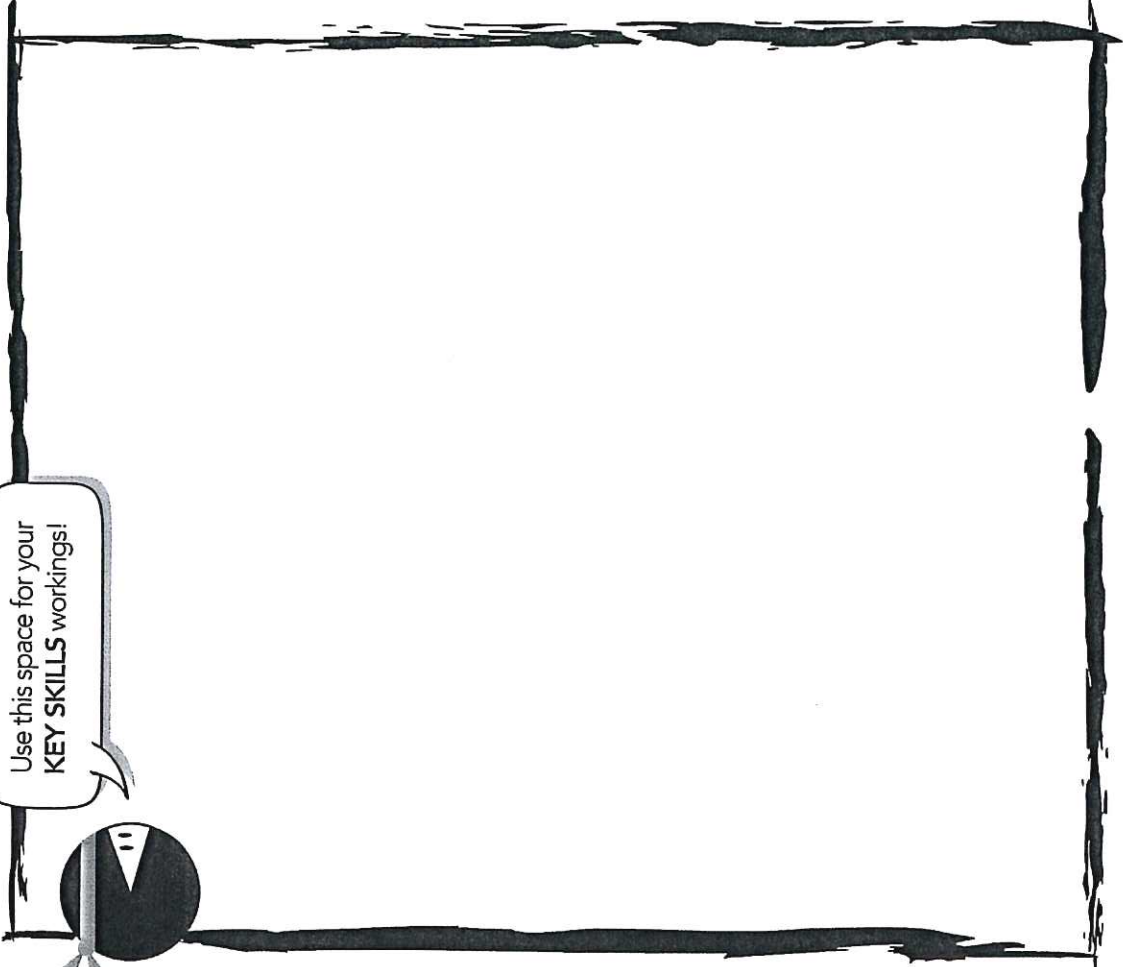
KEY SKILLS: +

MY **NINJA** BELT:

NINJA SCORE:



Use this space for your
KEY SKILLS workings!

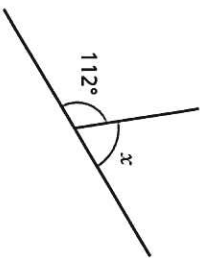


Understand and use basic angle rules and notation

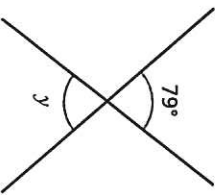
1 Complete the angle rules.

- a) Angles on a straight line _____
- b) Angles around a point _____
- c) Vertically opposite angles _____
- d) Angles in a triangle _____
- e) Angles in a quadrilateral _____

2 Work out the sizes of the unknown angles. Give reasons for your answers.

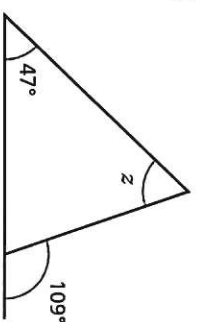


a) $x =$ because _____

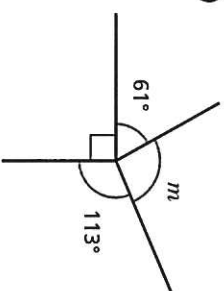


b) $y =$ because _____

c) $z =$ because _____

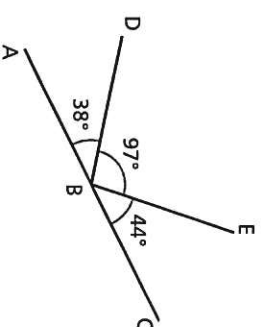


d) $m =$ because _____



3 a) Write the size of the given angles.

- ABD
- EBC
- DBE



b) Is ABC a straight line? _____
 How do you know?

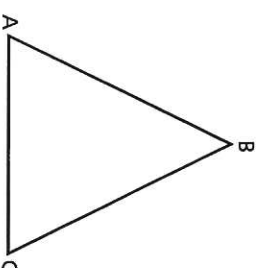
4 Here is a triangle.

a) $\angle BAC = 64^\circ$

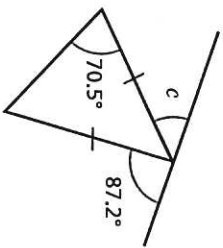
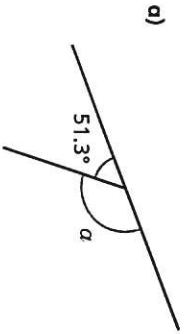
Show this information on the triangle.

b) Given that $\angle BCA = 52^\circ$, is triangle ABC isosceles? _____

Explain your answer.

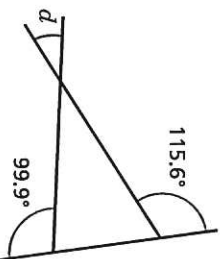
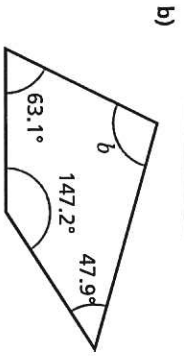


5 Work out the size of the unknown angles.



a =

c =

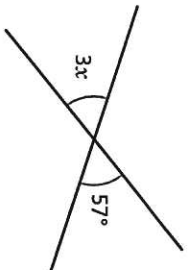
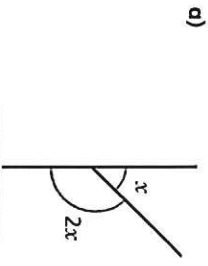


b =

d =

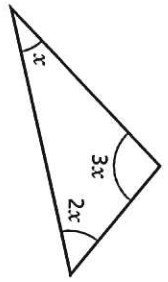
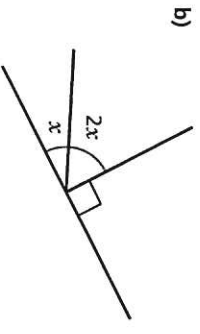
Discuss your reasons with a partner.

6 Work out the value of x .



x =

x =



x =

x =

7 The angles in a triangle are in the ratio 2 : 3 : 5

Is the triangle a right-angled triangle? _____

Show your workings.

8 AB and CD are straight lines.

The lines AB and CD intersect at point E.

Angle CEB is 47° greater than angle AEC.

a) Draw a diagram to represent this information.

b) Work out the size of each angle.

Give your answers using correct angle notation.

Create your own problem like this for a partner.

Investigate angles between parallel lines and the transversal

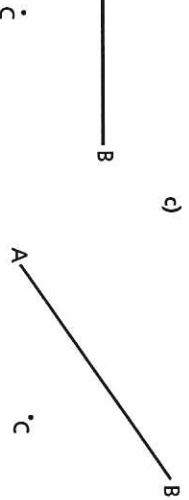
1 For each diagram, draw a line segment that is parallel to AB and goes through point C.

Draw on the diagrams to indicate that the lines are parallel.

a)



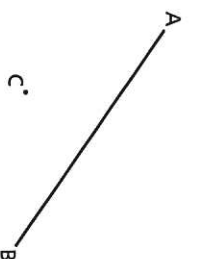
c)



b)

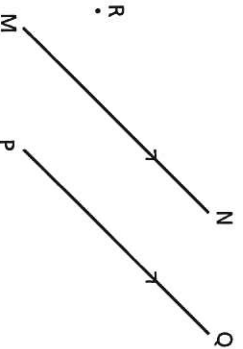


d)



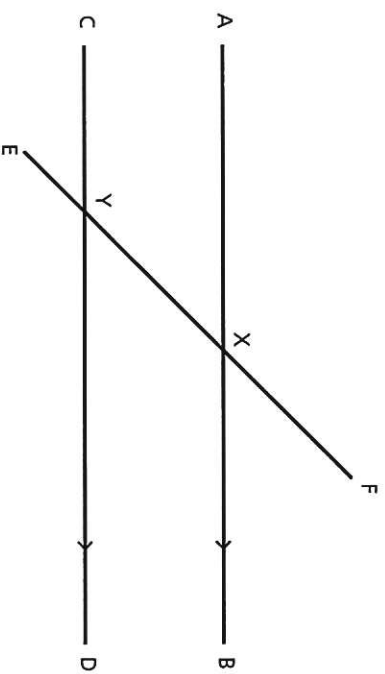
2 Line segments MN and PQ are parallel.

Draw a transversal that cuts through the parallel lines and goes through point R.



3 Line segments AB and CD are parallel.

Line segment EF is a transversal that intersects the line segments at points X and Y respectively.



a) Measure the size of each angle.

- | | |
|-------------------------------------|-------------------------------------|
| $\angle AXF =$ <input type="text"/> | $\angle BXF =$ <input type="text"/> |
| $\angle AXE =$ <input type="text"/> | $\angle BXE =$ <input type="text"/> |
| $\angle CYF =$ <input type="text"/> | $\angle DYF =$ <input type="text"/> |
| $\angle CYE =$ <input type="text"/> | $\angle DYE =$ <input type="text"/> |

Compare answers with a partner.

What do you notice?

b) Complete the sentences.

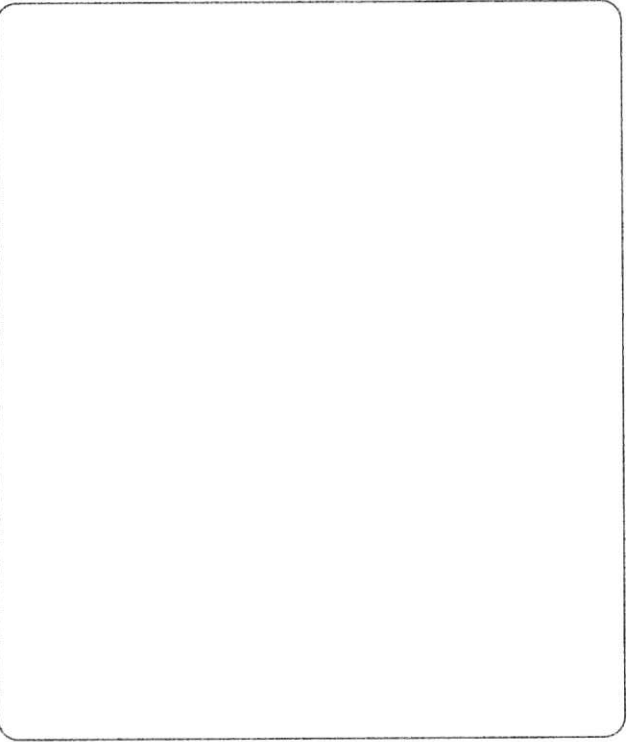
- Angle AXE is alternate to angle _____
- Angle AXE is corresponding to angle _____
- Angle BXF is corresponding to angle _____
- Angle CYF is alternate to angle _____

4

Line segments QR and ST are parallel.

Line segment UV is a transversal that intersects the line segments at points X and Y respectively.

a) Draw a diagram to represent this.



Compare your diagram with a partner's diagram.

Do they look the same? Does it matter? Why?

b) Eight angles are formed. Measure the size of each angle and label them on the diagram.

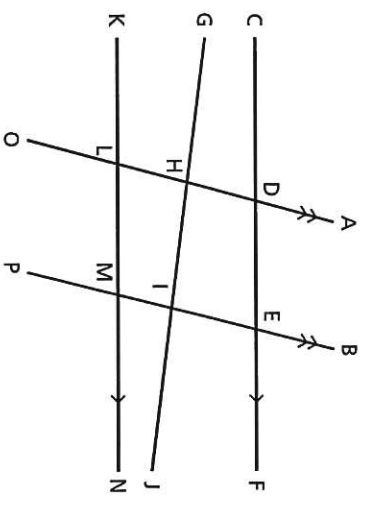
Compare answers with a partner.

What is the same and what is different?

c) Identify two pairs of alternate angles and two pairs of corresponding angles.

What do you notice?

5



d) Complete the sentence in two ways.

Line segments _____ and _____ are parallel.

Line segments _____ and _____ are parallel.

b) Complete the sentence.

GJ is a _____ that intersects the line segments

_____ and _____

c) Identify four pairs of alternate angles.

d) Identify four pairs of corresponding angles.

e)

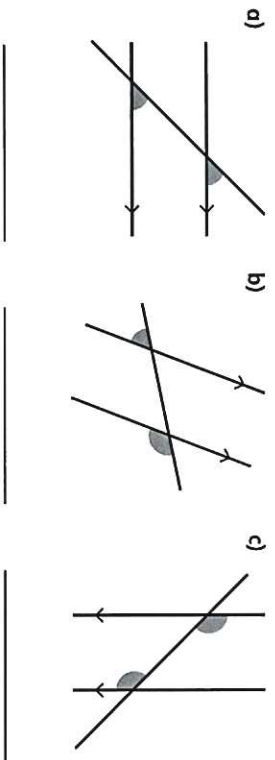


Do you agree with Dora? _____

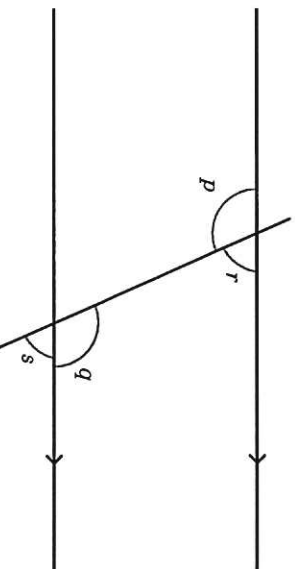
Explain your answer.

Identify and calculate with alternate and corresponding angles

1 Are the pairs of angles alternate, corresponding or neither?

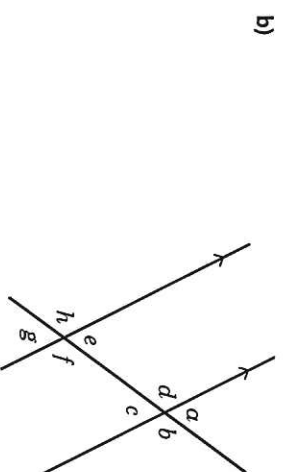
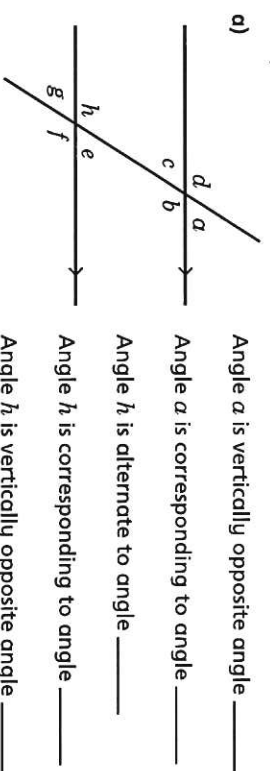


2 Four angles are labelled on the diagram.

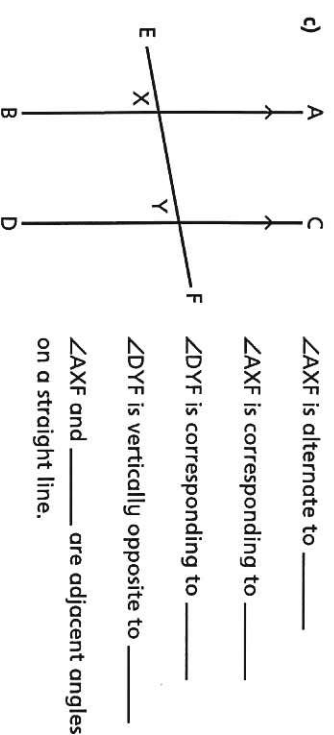


- a) p and q are alternate angles. Measure the size of each angle and label them on the diagram.
What do you notice?
- b) Complete the sentence.
Alternate angles are _____
- c) r and s are corresponding angles. Measure the size of each angle and label them on the diagram.
What do you notice?
- d) Complete the sentence.
Corresponding angles are _____

3 Complete the sentences.



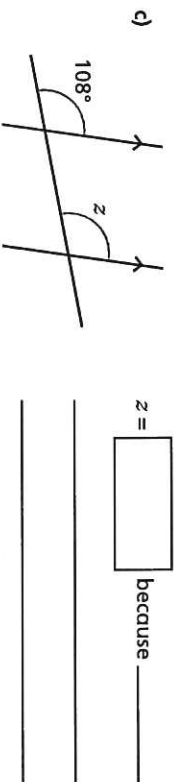
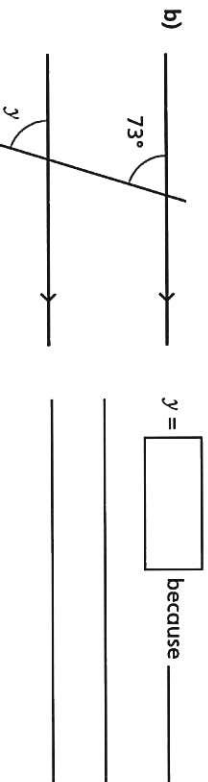
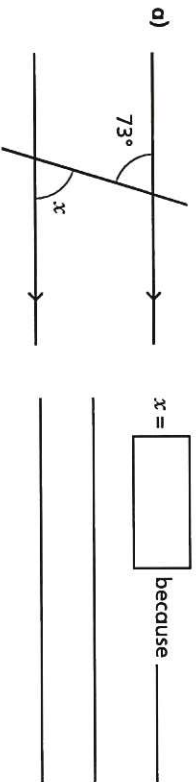
- Angles d and _____ are adjacent angles on a straight line.
Angles d and _____ are alternate angles.
Angles _____ and d are corresponding angles.
Angles d and _____ are vertically opposite angles.



4

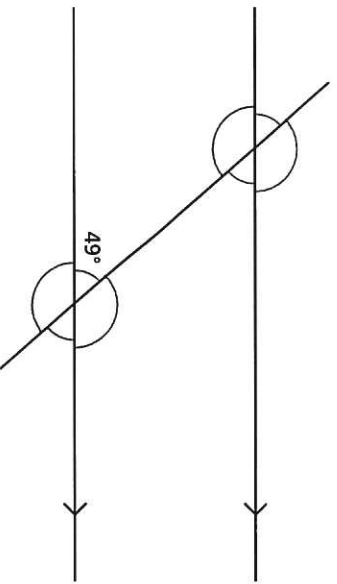
Work out the sizes of the unknown angles.

Give reasons for your answers.



5

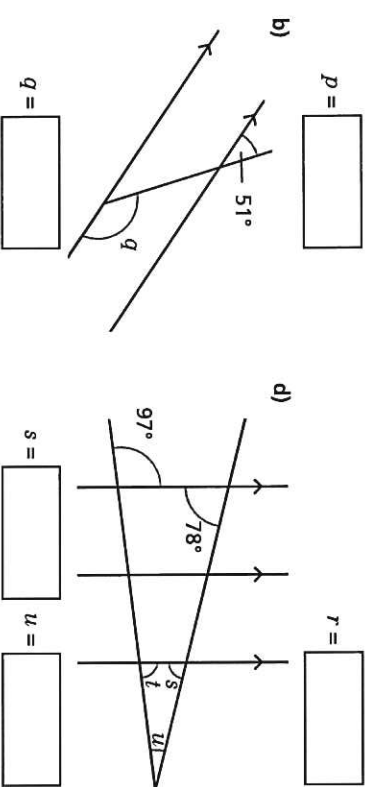
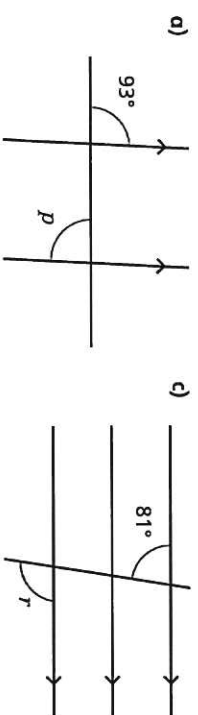
Work out the sizes of the unknown angles and label them on the diagram.



Compare your thinking with a partner.
 Did you work them out the same way?

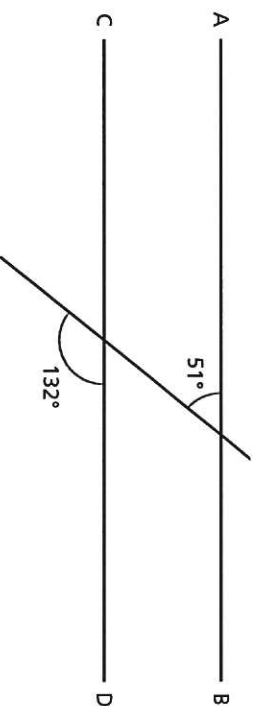
6

Work out the sizes of the unknown angles.



Discuss your reasons with a partner.

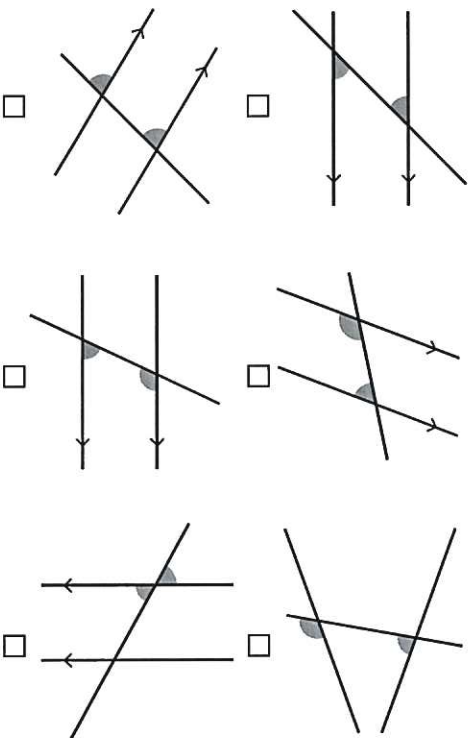
7



Are line segments AB and CD parallel? _____
 Explain your answer.

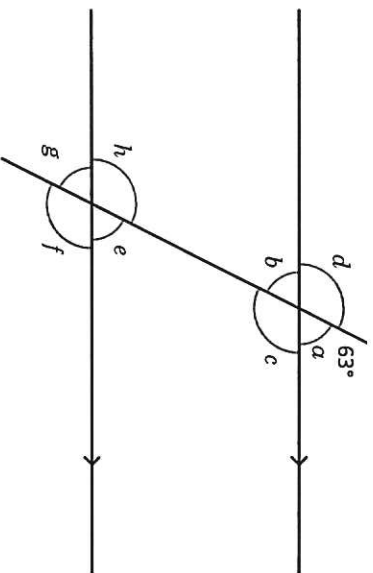
Identify and calculate with co-interior, alternate and corresponding angles

1 Which pairs of angles are equal? Tick your answers.



Discuss your answers with a partner.

2 a) Work out the sizes of the unknown angles and label them on the diagram.



b) Angles c and e are co-interior.
What is the sum of angles c and e ?

c) Angles b and h are also co-interior.
What is the sum of angles b and h ?

d) What do you notice?

e) Complete the sentence.

Co-interior angles _____

3 Complete the sentences.

a) Angles c and _____ are co-interior.



Angles e and _____ are co-interior.



Angles h and _____ are co-interior.



Angles b and _____ are co-interior.

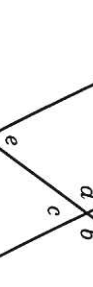
b) Angles e and a are _____



Angles e and d are _____



Angles e and c are _____

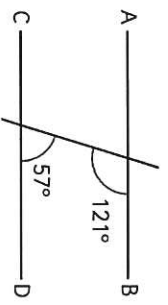


Angles e and g are _____

4

Mo has measured two angles.

- a) Are line segments AB and CD parallel? _____
 Explain your answer.



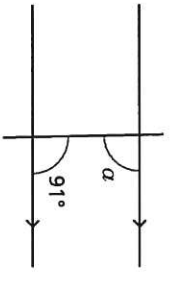
- b) Eva says, "I think they could be parallel."
 Why might Eva think this?

5

Work out the sizes of the unknown angles.

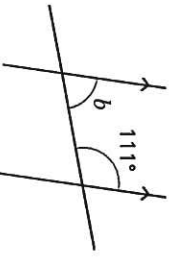
Give reasons for your answers.

a)



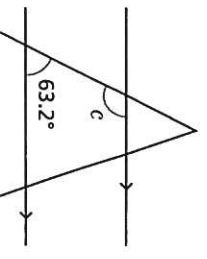
$\alpha =$ because _____

b)



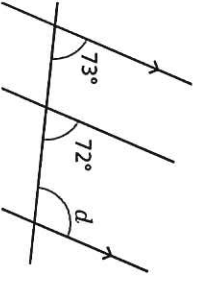
$b =$ because _____

c)



$c =$ because _____

d)

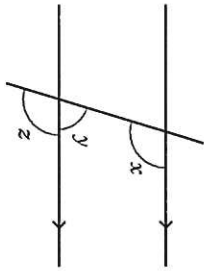


$d =$ because _____

6

Work out the size of angle z.

$x : y = 2 : 1$

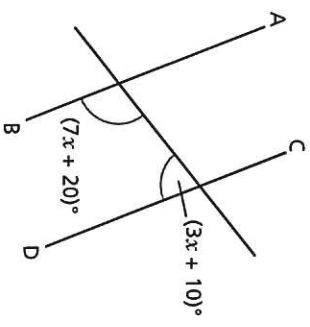


$z =$

Discuss your reasoning with a partner.

7

- a) Show that line segments AB and CD are not parallel when $x = 12$
 Explain your answer.



- b) Line segments AB and CD are parallel. Work out the sizes of the angles and label them on the diagram.

Discuss your method with a partner.

Solve complex problems with parallel line angles

1

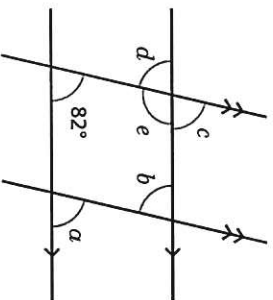
Sort the cards into the table.

A	B	C	D
E	F	G	H

Angles are equal	Angles sum to 180°	Not enough information

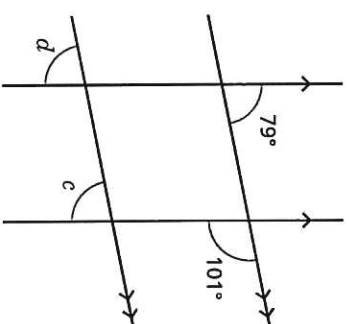
2

Work out the sizes of the unknown angles.



- a)
- $a =$
- $b =$
- $c =$
- $d =$
- $e =$

b)

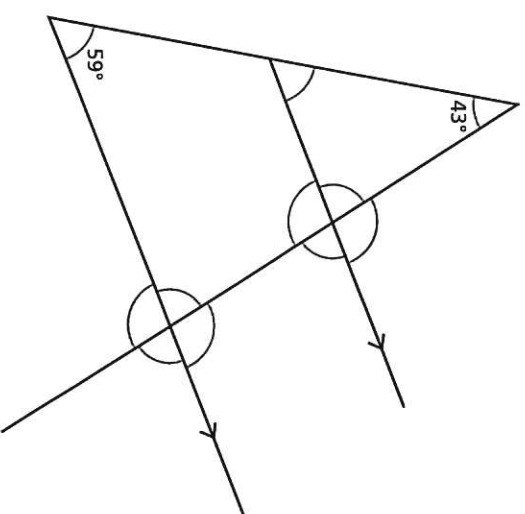


- $c =$
- $d =$

Compare your method with a partner. Which angle rules did you use?

3

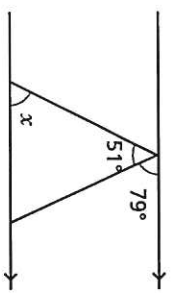
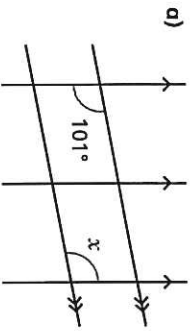
Work out the sizes of the unknown angles and label them on the diagram.



Discuss your reasons for each angle with a partner.
Did you work them out the same way?

4

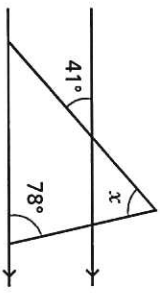
Work out the size of angle x in each diagram.



$x =$

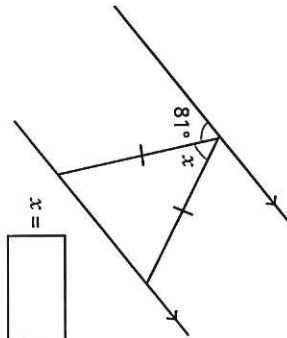
$x =$

b)



$x =$

d)

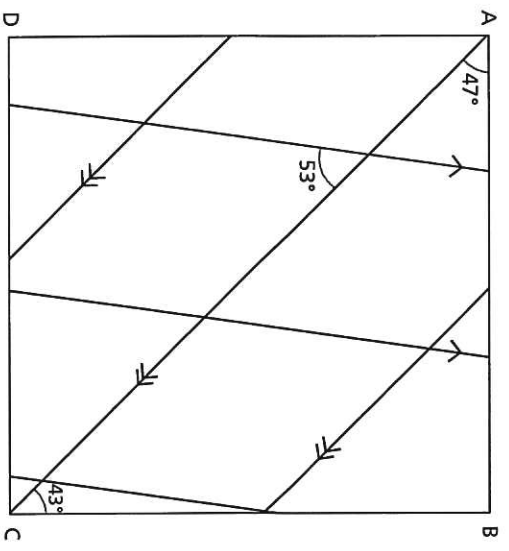


$x =$

5

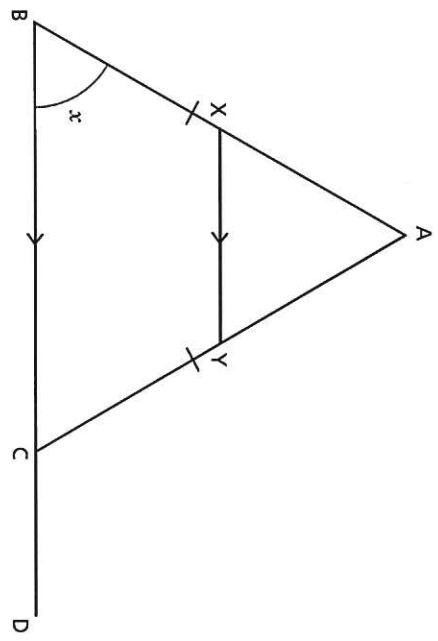
ABCD is a rectangle.

Work out as many of the unknown angles as possible and label them on the diagram.



6

ABC is an isosceles triangle. Line segments XY and BD are parallel.



a) Write an expression in terms of x for the size of each angle.

$\angle ACB =$ _____ $\angle ACD =$ _____

$\angle AYYX =$ _____ $\angle BXY =$ _____

$\angle AXY =$ _____ $\angle XYC =$ _____

$\angle BAC =$ _____

b)

x can take any value.
I'm going to use $x = 93^\circ$ to work out the size of each angle.

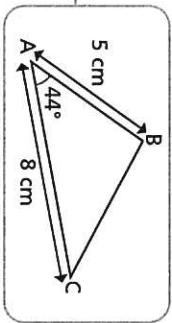


Explain why Amir's value for x is not suitable.

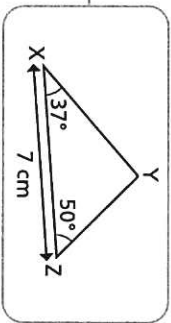
What would be a more suitable value for x ?

Construct triangles and special quadrilaterals

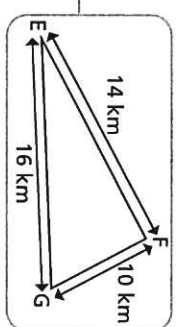
1 Use a ruler and protractor to make an accurate drawing of triangle ABC.



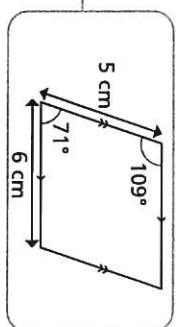
2 Use a ruler and protractor to make an accurate drawing of triangle XYZ.



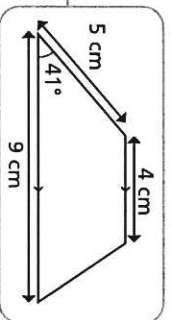
3 Use a scale of 1 cm = 2 km to make an accurate drawing of triangle EFG.



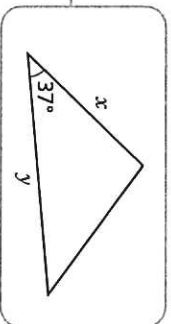
4 Use a ruler and protractor to make an accurate drawing of the parallelogram.



- 5 Use a ruler and protractor to make an accurate drawing of the trapezium.

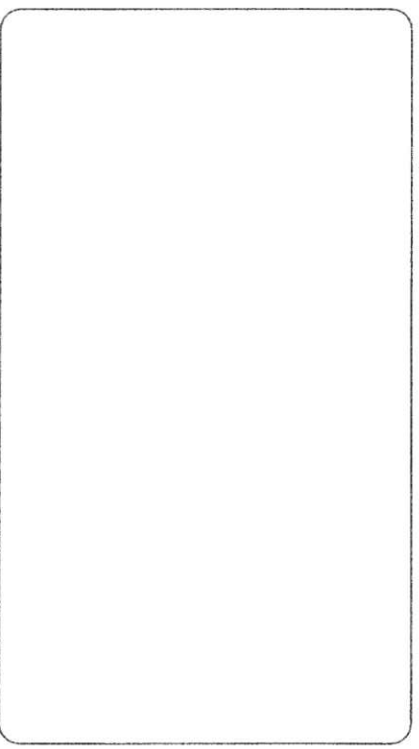


- 6 Use a ruler and protractor to accurately construct the triangle.
 $x = 5$ cm and the ratio of $x : y$ is 2 : 3

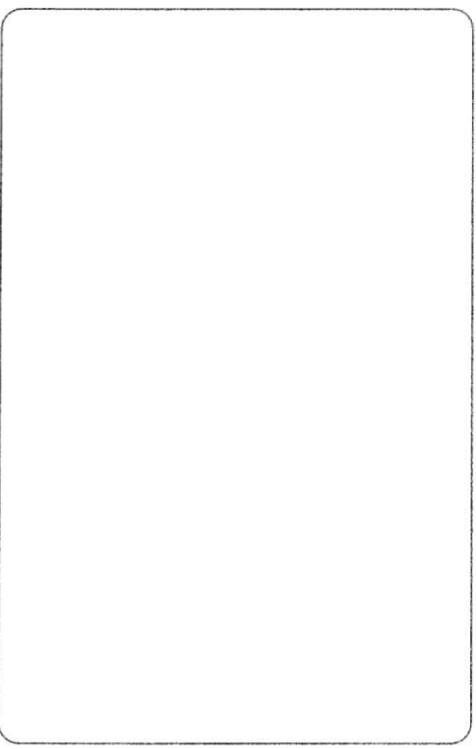


7

- a) Construct an equilateral triangle with a side length of 4 cm.



- b) Construct an equilateral triangle with a side length of 6 cm.



What is the same about the methods for parts a) and b)?
What is different?

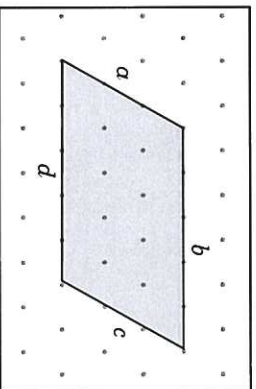
- 8 An isosceles triangle has the measurements 10 cm and 4 cm. Huan says, "I'm going to draw my triangle with a side length of 10 cm and two sides with a length of 4 cm." Explain why Huan's triangle will not work.



Investigate the properties of special quadrilaterals

1

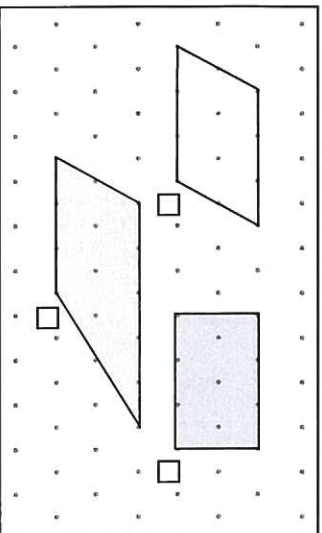
The diagram shows a parallelogram.



a) What two things do you notice about sides a and c ?

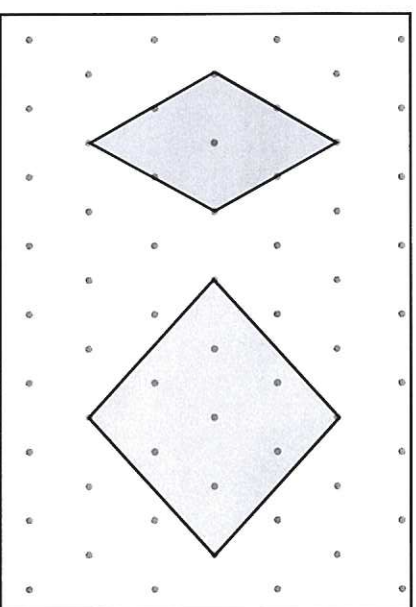
b) What two things do you notice about sides b and d ?

c) Which of these shapes are parallelograms?
Tick your answers.



2

Here are two rhombuses.

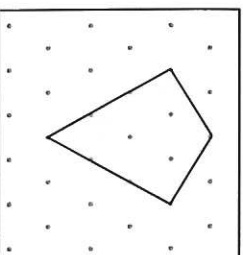


a) What do you notice about the lengths of the sides in a rhombus?

b) Measure the angles in each rhombus and label the diagram.

c) What do you notice about the sizes of the angles in a rhombus?

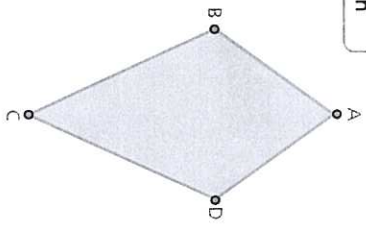
d) Explain why this shape is not a rhombus.



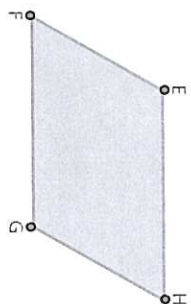
3

Ron and Rosie are using some geometric software to make kites. They make these shapes.

Ron



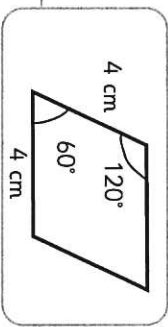
Rosie



- a) Who has made a kite? _____
- b) Explain why one shape is a kite and the other is not.

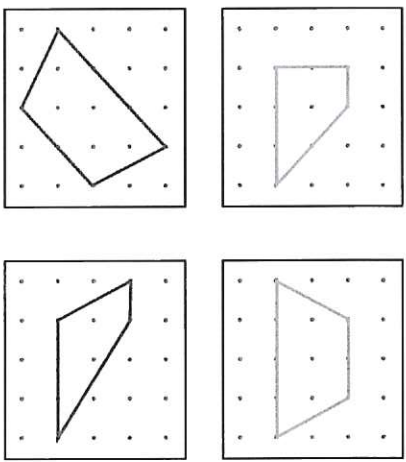
4

Here is a sketch of rhombus. Construct the rhombus using a ruler and protractor.



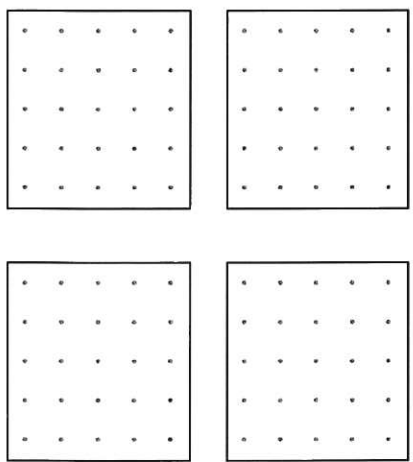
5

Mr Simpson's Maths class are making trapeziums on geoboards. Here are four that they have made.



- a) What is a trapezium? Write a definition.

- b) Make or draw four more trapeziums.



- c) Here are two types of trapeziums.

right trapezium

isosceles trapezium

Define the properties of each of these trapeziums.



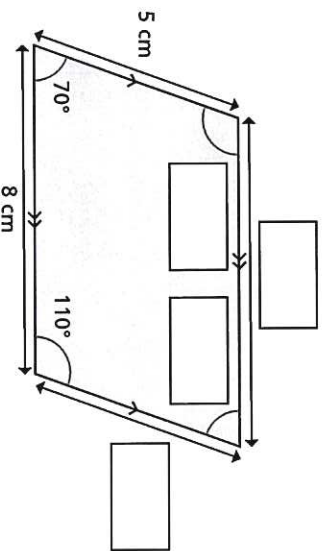
Identify and calculate with sides and angles in special quadrilaterals

1

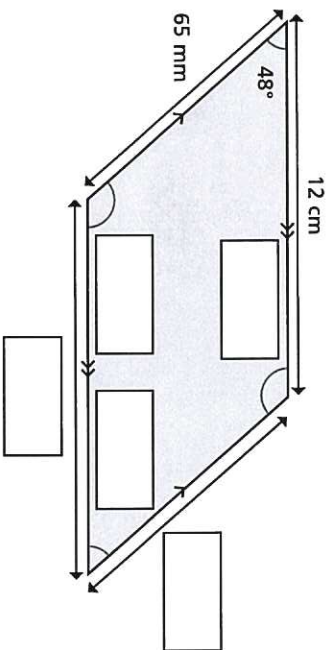
Here are some parallelograms.

Find the unknown sides and angles and label the diagrams.

a)

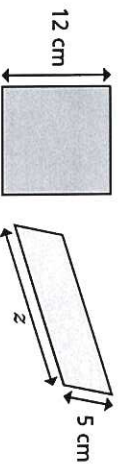


b)



2

The perimeter of the square and parallelogram are the same. Work out the length of z .



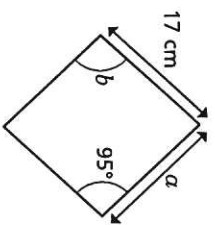
$z =$ cm

3

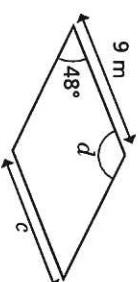
These shapes are both rhombuses.

Find the unknown sides and angles.

a)



b)



$a =$ cm

$b =$ °

$c =$ m

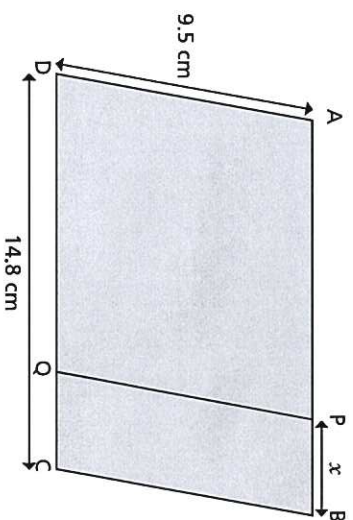
$d =$ °

4

ABCD is a parallelogram.

APQD is a rhombus.

Find the distance marked x .

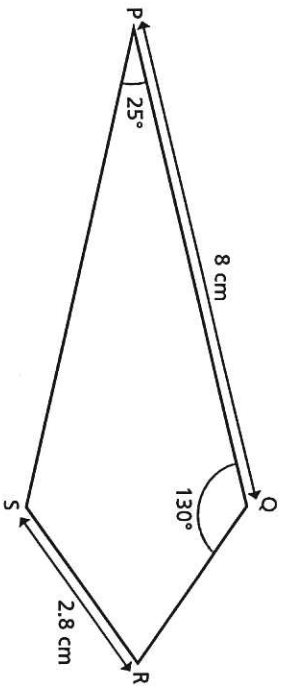


Explain your reasoning.

$x =$ cm



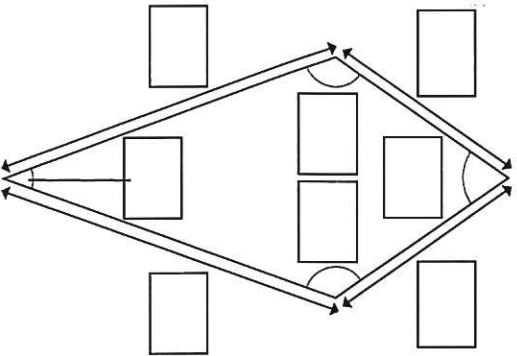
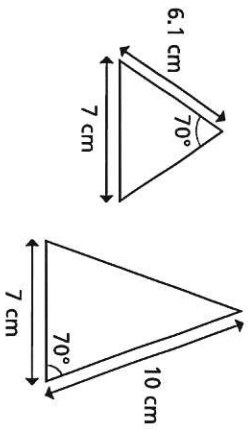
5 PQRS is a kite.



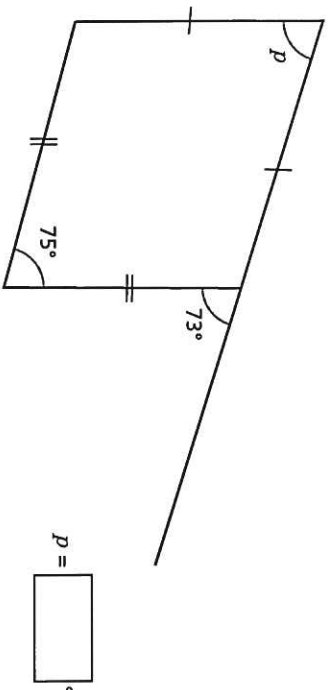
- a) What is the length of side QR?
- b) What is the size of angle PSR?
- c) Calculate the size of angle QRS.

cm

6 The two isosceles triangles are used to make a kite. Label the lengths of the sides and the angles on the kite.

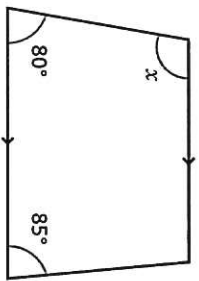


7 Work out the size of angle p .

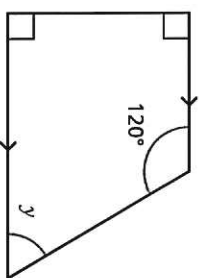


$p =$

8 Work out the unknown angles in these trapeziums.

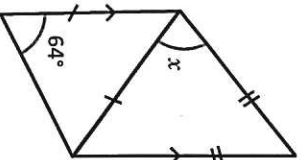


$x =$



$y =$

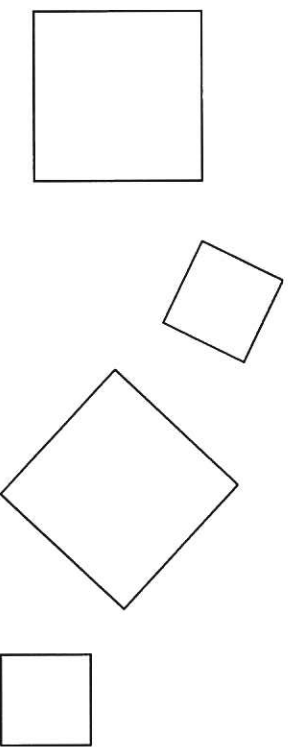
9 Find the size of angle x . Show all your workings.



$x =$

Understand and use the properties of diagonals of quadrilaterals

1 Here are four squares.



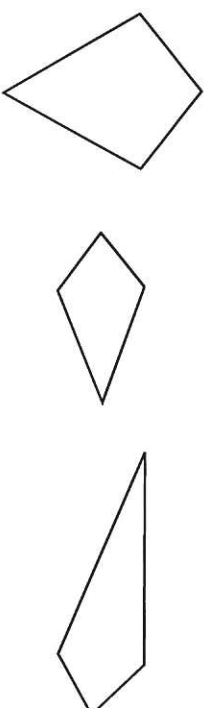
- a) Join opposite corners of each square.
 b) What do you notice about where the diagonal lines intersect?

2 Show that the diagonals of a rectangle do not meet at right angles.

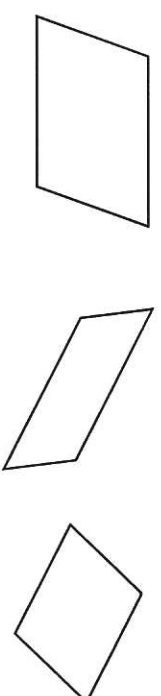
3 Do the diagonals of each shape intersect at right angles?

Here are some shapes to test.

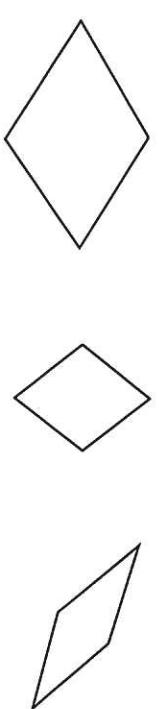
kites



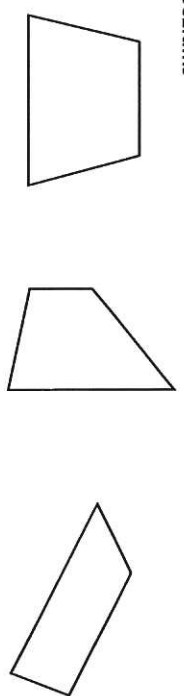
parallelograms



rhombuses



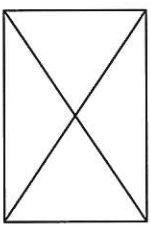
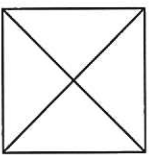
trapeziums



Complete the table.

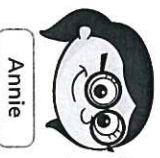
Shape	Diagonals intersect at 90°	Yes or No
kite		
parallelogram		
rhombus		
trapezium		

- 4 Annie draws the diagonals of a square.
Jack draws the diagonals of a rectangle.



The diagonals divide the shape into four equal parts.

This is the same for rectangles too.



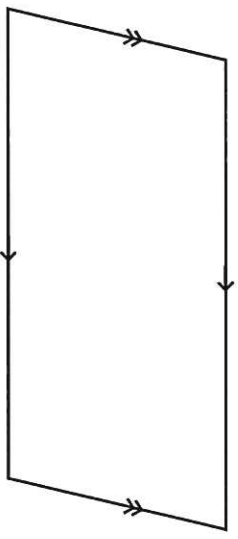
Annie



Jack

Prove that Jack is correct.

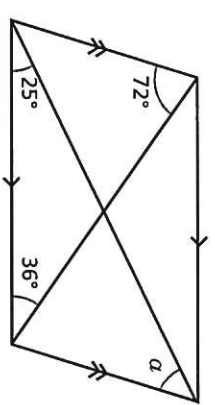
- 5 Do the diagonals of a parallelogram bisect the angles? _____



Explain your answer.



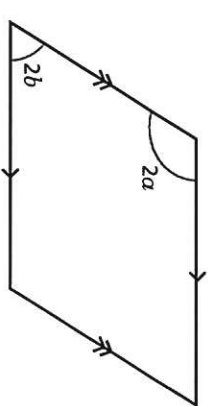
- 6 Find the size of angle a .



Show all your workings.

$a = \square^\circ$

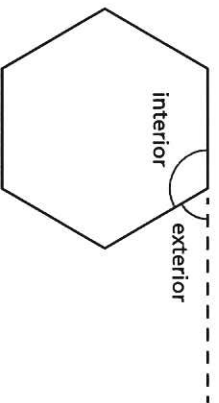
- 7 Prove that the diagonals of a rhombus intersect at right angles.
You can assume that a diagonal bisects each angle.



Show all your workings.

Understand and use the sum of exterior angles of any polygon

- 1 The diagram shows an interior angle of a hexagon and its adjacent exterior angle.



- a) Talk to a partner about why you think they are called interior and exterior angles.

- b) Choose from the list to complete the sentences.

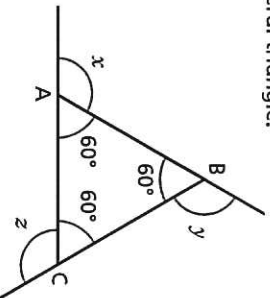
adjacent interior exterior straight sum 180°

An _____ angle and its _____ angle form a _____ line. Therefore they _____ to _____.

- c) Complete the statement.

interior angle + exterior angle =

- 2 ABC is an equilateral triangle.



- a) Explain why each of the interior angles is 60°.

- b) x , y and z are the exterior angles of triangle ABC.

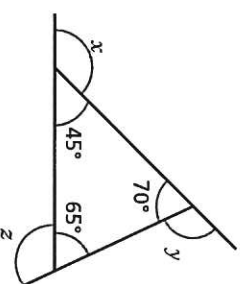
Work out the sizes of these angles.

$x =$ $y =$ $z =$

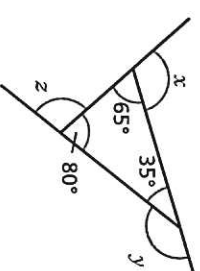
- c) Complete the calculation.

$x + y + z =$

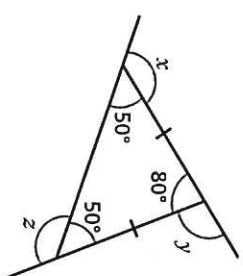
- d) Work out the exterior angles of each triangle. Label them on the diagram and complete the calculations.



$x + y + z =$



$x + y + z =$

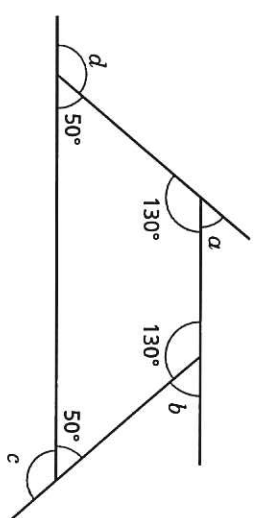


$x + y + z =$

- 3 Work out the size of the exterior angle of each polygon.

Then work out the sum of the exterior angles.

- a)



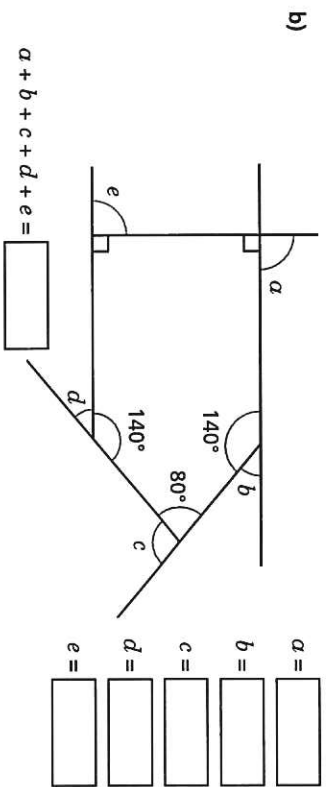
$a =$

$b =$

$c =$

$d =$

$a + b + c + d =$

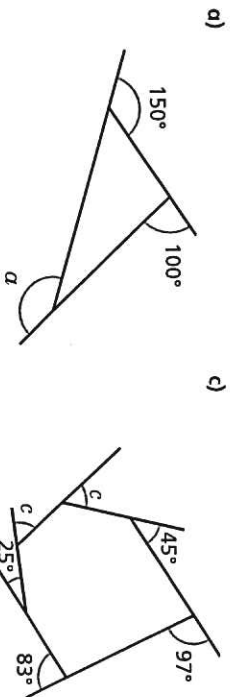


What do you notice?

4 Complete the sentence.

The sum of the exterior angles of any polygon is

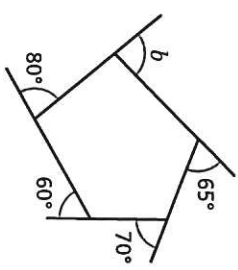
5 Work out the sizes of the unknown angles.



$a =$

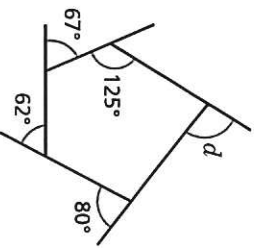
$c =$

b)



$b =$

d)



$d =$

6 Work out the size of the exterior angles of regular polygons with the given number of sides.

- a) 3 sides c) 5 sides e) 10 sides

- b) 4 sides d) 6 sides f) 36 sides

7 A regular polygon has n sides.

a) Write an expression for the size of each exterior angle.

b) Write an expression for the size of each interior angle.

8 A regular polygon has an exterior angle of 30° .

How many sides does the polygon have?

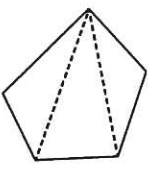
Understand and use the sum of the interior angles in any polygon

1

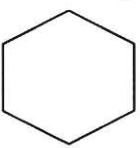
The sum of the interior angles of a triangle is 180° .

Split the polygons into triangles to work out the sum of their interior angles. Your lines should not overlap.

The first one has been done for you.



a) number of sides = 5
number of triangles = 3
 $3 \times 180 = 540$
The sum of the interior angles of a pentagon is 540° .



b) number of sides =
number of triangles =
 $\times 180 =$
The sum of the interior angles of a hexagon is



c) number of sides =
number of triangles =
 $\times 180 =$
The sum of the interior angles of a heptagon is

What do you notice about the number of sides compared to the number of triangles?

2

Complete the table.

Shape	Number of sides	Number of triangles	Sum of interior angles
quadrilateral	4	2	360°
pentagon			
nonagon			
decagon	6		
		6	
			$1,800^\circ$

Compare answers with a partner.

3

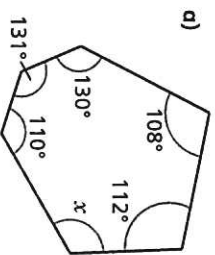
Aisha is working out the sum of the interior angles of a polygon. Here are her workings.

$10 \times 180 = 1,800^\circ$

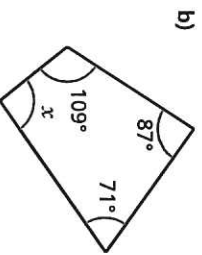
Do you agree with Aisha? _____
Explain your answer.

4

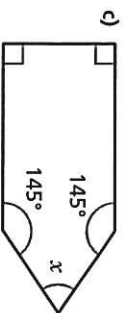
Work out the sum of the interior angles for each polygon. Then work out the sizes of the unknown angles.

sum of interior angles =

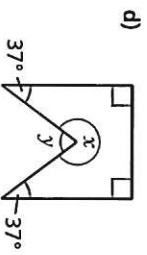
$$x = \boxed{}$$

sum of interior angles =

$$x = \boxed{}$$

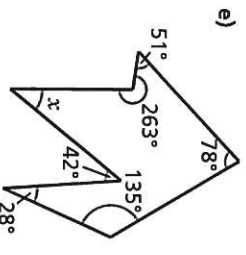
sum of interior angles =

$$x = \boxed{}$$

sum of interior angles =

$$x = \boxed{}$$

$$y = \boxed{}$$

sum of interior angles =

$$x = \boxed{}$$

5

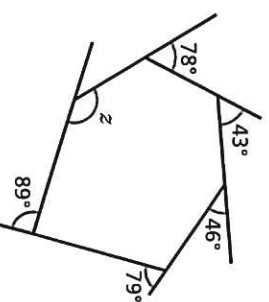
A polygon has n sides.

d) Write an expression in terms of n for the number of triangles inside the shape.

b) Write an expression in terms of n for the sum of the interior angles of the polygon.

6

Here is an irregular hexagon.



d) Work out the size of angle z

$$z = \boxed{}$$

b) Did you use rules of interior angles or exterior angles?
Circle your answer

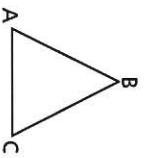
interior exterior

Compare with a partner. Did they work it out the same way?



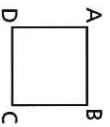
Calculate missing interior angles in regular polygons

1 ABC is an equilateral triangle.



- a) What is the sum of the interior angles of the triangle?
- b) What is the size of each interior angle?
- c) What calculation did you do to work out the size of each interior angle?

2 ABCD is a square.

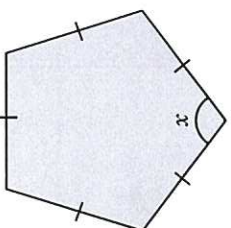


- a) What is the sum of the interior angles of the square?
- b) What is the size of each interior angle?
- c) What calculation did you do to work out the size of each interior angle?

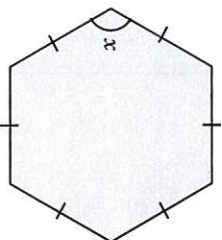
3

An equilateral triangle and a square are examples of regular polygons. Describe in your own words what it means for a polygon to be regular.

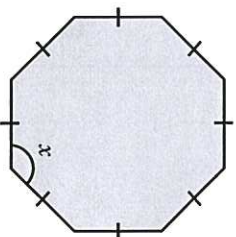
4 Work out the size of angle x in the regular polygons.



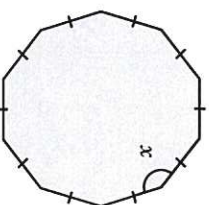
number of sides = 5
 sum of interior angles =
 $\div 5 =$
 $x =$



number of sides =
 sum of interior angles =
 \div =
 $x =$



number of sides =
 sum of interior angles =
 \div =
 $x =$



number of sides =
 sum of interior angles =
 \div =
 $x =$

5

A regular polygon has 20 sides.

a) Work out the size of each interior angle.

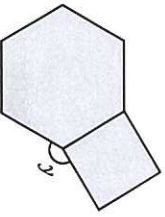
b) Work out the size of each exterior angle.

6

Each compound shape is made up of regular polygons.

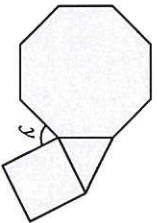
Work out the size of angle y in each case.

a)



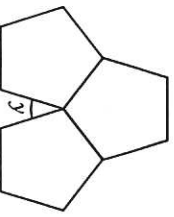
$$y = \boxed{}$$

c)



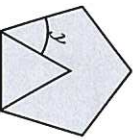
$$y = \boxed{}$$

b)



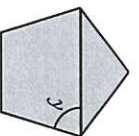
$$y = \boxed{}$$

d)



$$y = \boxed{}$$

e)



$$y = \boxed{}$$

f)



$$y = \boxed{}$$

7

A regular polygon has n sides.

a) Write an expression for the sum of the angles in the polygon.

b) Write an expression for the size of each interior angle in the polygon.

8

x is the exterior angle of a regular polygon.

y is the interior angle of the polygon.

$$x : y = 1 : 8$$

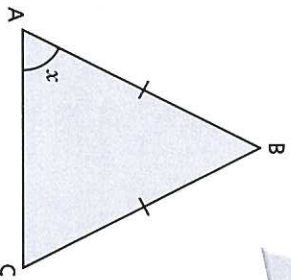
How many sides does the polygon have?

Prove simple geometric facts

H

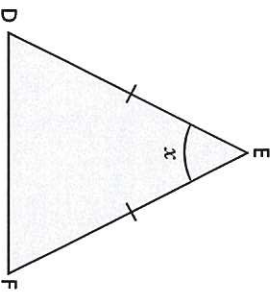
1 ABC is an isosceles triangle.

- a) Write an expression for the size of angle ACB. _____
- b) Show that angle ABC = $180 - 2x$
Give reasons to support your answer.



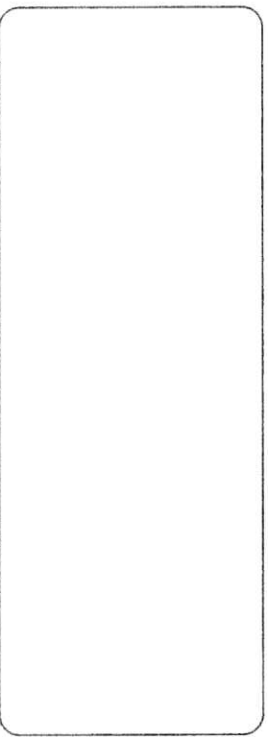
2 DEF is an isosceles triangle.

- Show that $\angle EDF = \frac{180 - x}{2}$
Give reasons to support your answer.



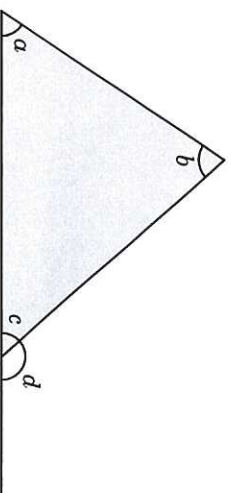
3 Line segments AB and CD are parallel.

- EF is a transversal that cuts through the line segments at points X and Y respectively.
Angle AXF = t
- a) Draw a diagram to show this.



- b) Show that angle FYD = $180 - t$.
Give reasons to support your answer.

4 A triangle has interior angles a , b and c .



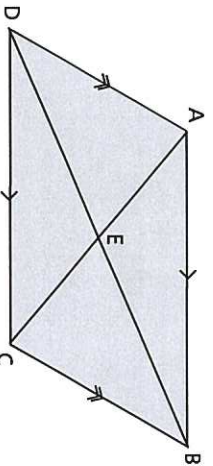
- Show that $d = a + b$.
Give reasons to support your answer.

5

ABCD is a parallelogram.

Prove that triangles AEB and CED are identical.

Give reasons to support your answer.

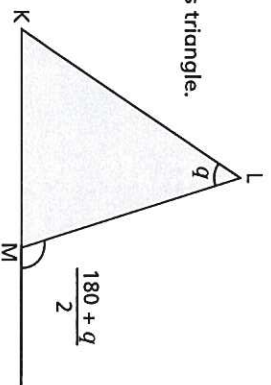


6

KLM is a triangle.

Prove that triangle KLM is an isosceles triangle.

Give reasons to support each stage of your workings.



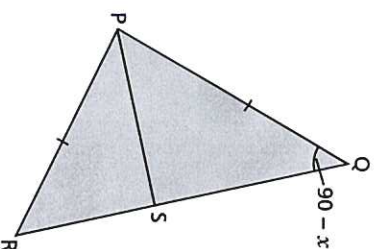
7

QPR is an isosceles triangle.

PS is perpendicular to QR.

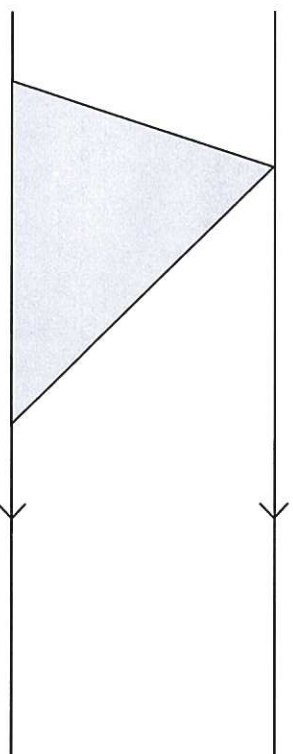
Prove that PS bisects angle QPR.

Give reasons to support each stage of your workings.



8

Use rules of parallel lines to prove that the sum of the angles in a triangle is 180° .



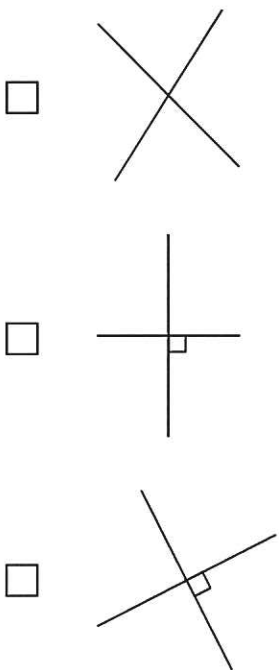
Compare your method with a partner's.

Construct a perpendicular bisector

H



1 Tick the perpendicular lines.



2 What is a perpendicular bisector of a line segment?

Talk about it with a partner.

3 Use a ruler and pair of compasses to bisect the line segment AB.



4 Construct the perpendicular bisector of each line.

a) 



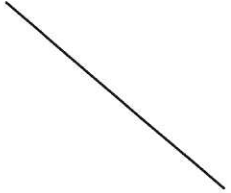
d) 



b) 



e) 



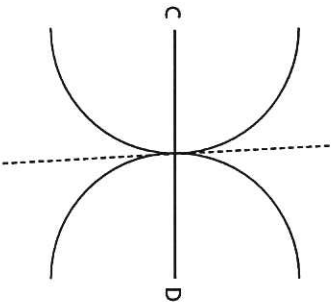
c) 



f) 



- 5 Filip is attempting to construct a perpendicular bisector of the line segment CD.



Explain what Filip has done wrong.

- 6 a) Draw a 6.4 cm line and label it XY.

- b) Construct a perpendicular bisector of the line.
c) Label the point where the line segment XY is bisected, Z.
d) What is the length of the line segment XZ?



- 7 a) Use a ruler and pair of compasses to construct an equilateral triangle with a side length of 5 cm.

- b) Construct the perpendicular bisector of each side of the triangle.
c) Use the point at which the perpendicular bisectors meet as the centre, and draw the circle that passes through each vertex of the triangle.

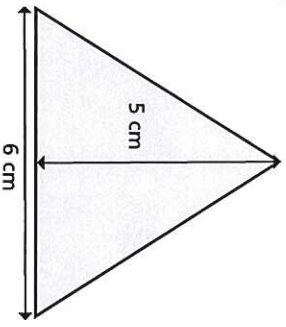
- 8 Write a set of instructions explaining how to construct a perpendicular bisector.



Calculate the area of triangles, rectangles and parallelograms

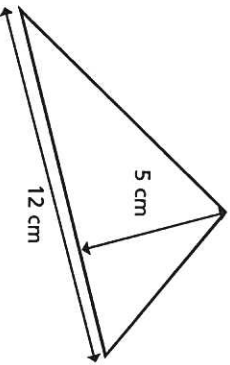
1 Find the areas of the triangles.

a)



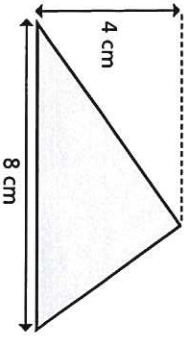
cm²

c)



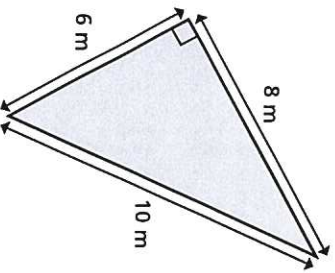
cm²

b)



cm²

d)

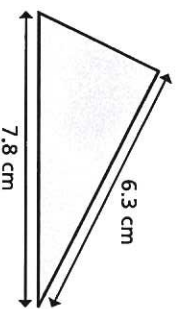


m²

2 Eva is working out the area of the triangle.



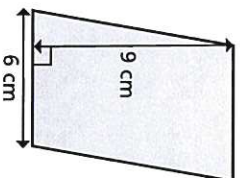
The base is 7.8 cm and the length of one side is 6.3 cm. I multiply and then divide by 2



What mistake has Eva made?

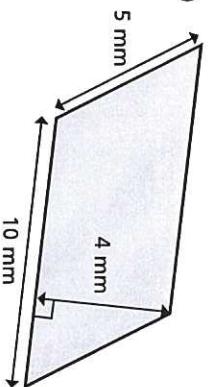
3 Find the areas of the parallelograms.

a)



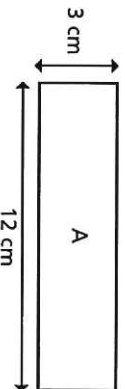
cm²

b)

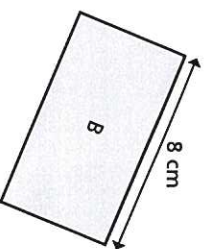


mm²

4 The two rectangles have the same area.

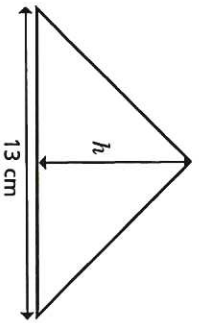


Work out the width of rectangle B.



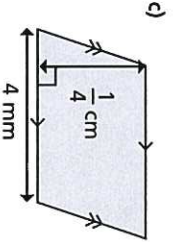
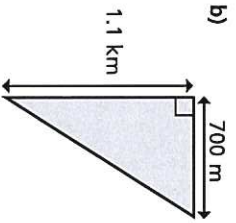
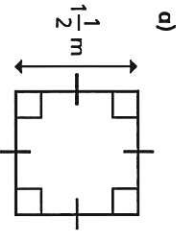
cm

- 5 The area of the triangle is 26 cm^2 .
What is its height?

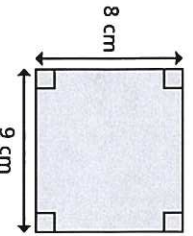
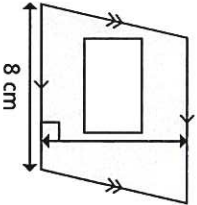
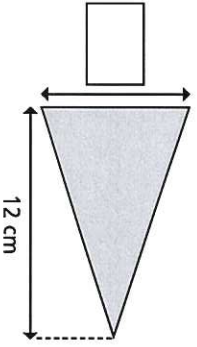


$h =$ cm

- 6 Work out the areas of the shapes.

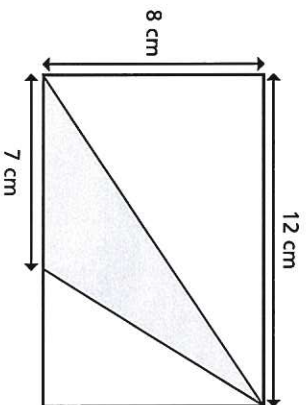


- 7 These three shapes all have the same area.



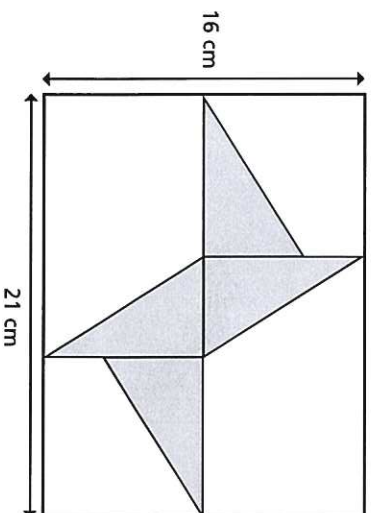
Find the missing values.

- 8 A rectangle is split into three triangles.
One of the triangles is shaded.
What is the ratio of shaded to non-shaded parts of the shape?



:

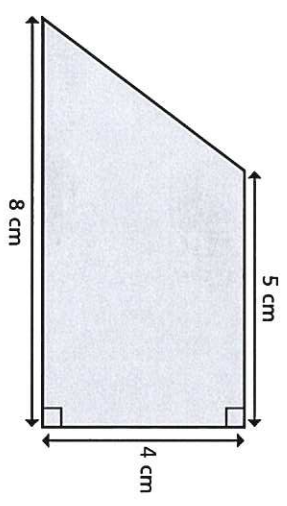
- 9 A logo is made from four identical right-angled triangles.



Find the area of one of the triangles.

Calculate the area of a trapezium

1 Amir and Rosie are working out the area of this trapezium.



Amir: I will divide the shape into a rectangle and triangle, and work out the area of each one.

Rosie: I will just use the formula for the area of a trapezium.

a) Use Amir's method to find the area of the trapezium.

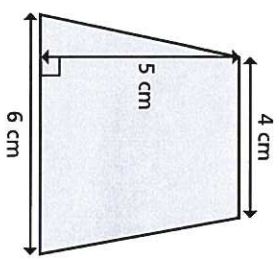
cm²

b) Use Rosie's method to find the area of the trapezium.

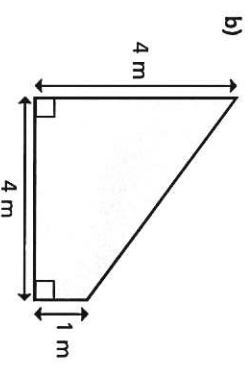
cm²

Whose method do you prefer? _____

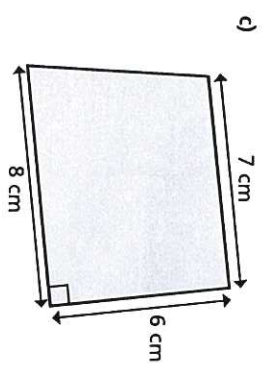
2 Find the area of each trapezium.



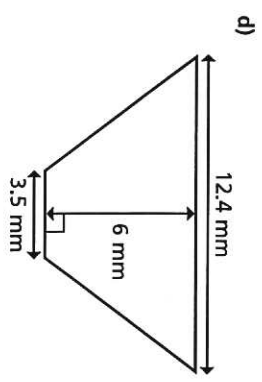
cm²



m²

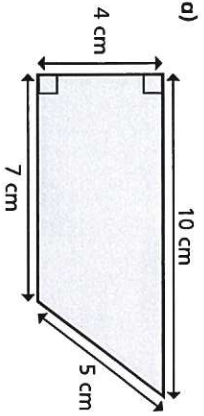


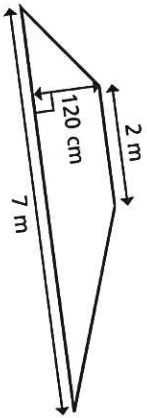
cm²



mm²

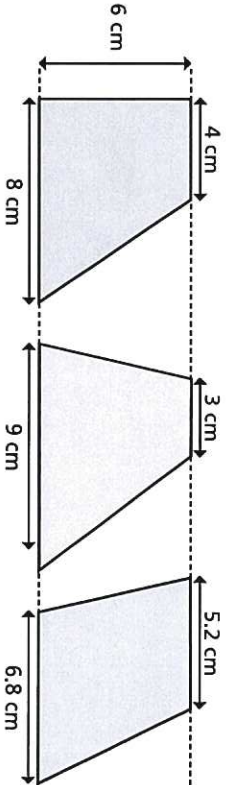
3 Work out the area of each trapezium.





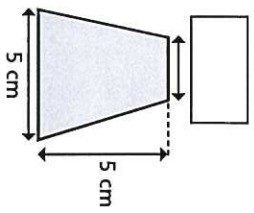
c) Discuss with a partner what mistakes could be made when working out the areas in parts a) and b).

4 Explain why these trapeziums all have the same area.

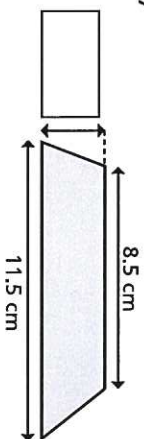


5 The area of each trapezium is 20 cm^2 . Find and label the missing lengths.

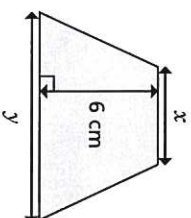
a)



b)



6 The area of the trapezium is 24 cm^2 .

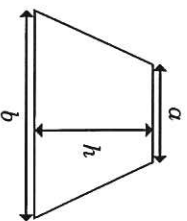


Write three possible pairs of values of x and y .

$x =$ <input type="text"/> cm	$y =$ <input type="text"/> cm
$x =$ <input type="text"/> cm	$y =$ <input type="text"/> cm
$x =$ <input type="text"/> cm	$y =$ <input type="text"/> cm

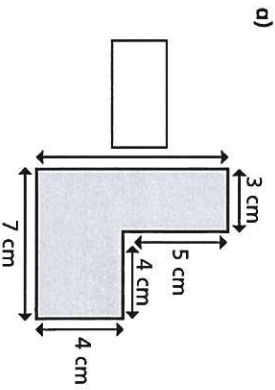
7 Prove the statement.

The formula for a trapezium is equal to the area of a parallelogram when the lengths of a and b are equal.

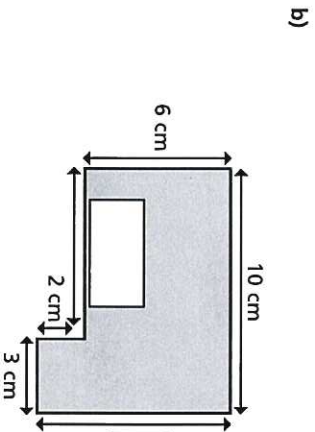


Calculate the perimeter and area of compound shapes (1)

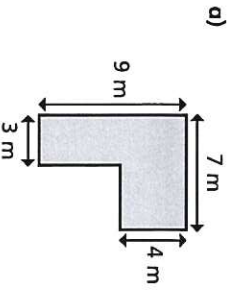
1 Work out the unknown lengths and then find the perimeter of each shape.



perimeter = cm

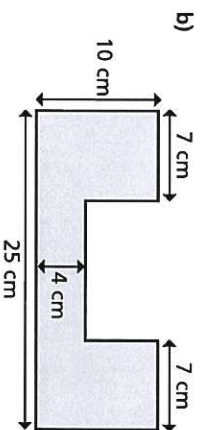


perimeter = cm



area = m²

2 Work out the area of each shape.



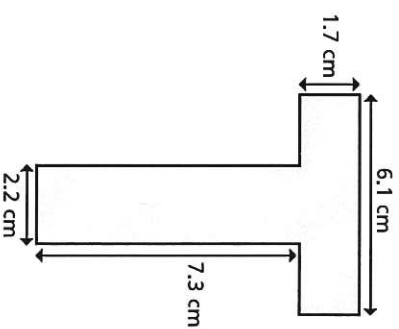
area = cm²

3

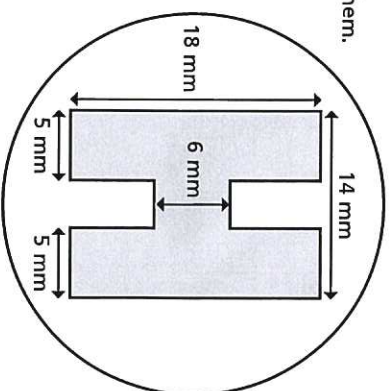


You can't work out the perimeter of this shape as you don't know the lengths of all the sides.

Is No correct? _____
Explain your answer.



4 Some stickers have the letter H on them. What is the area of the letter H?

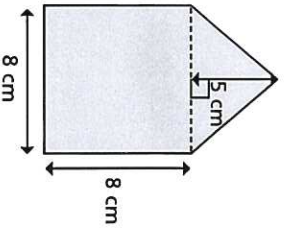


mm²

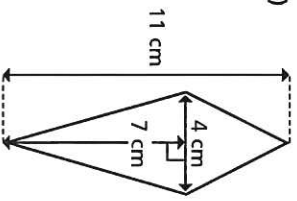
5

Find the area of each compound shape.

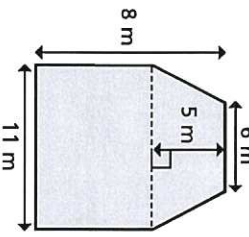
a)


 cm²

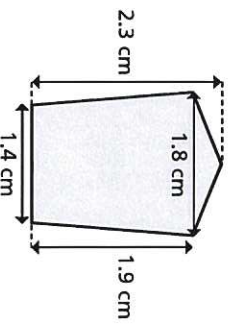
b)


 cm²

c)


 m²

d)

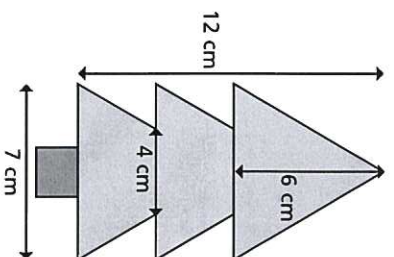

 cm²

6

Dani makes a picture of a tree.

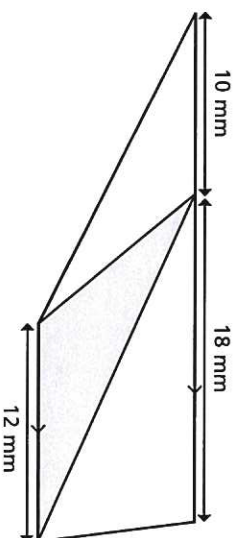
The tree is made up of a green triangle, two congruent green trapeziums and a brown square.

Find the area of the green part of the tree.


 cm²

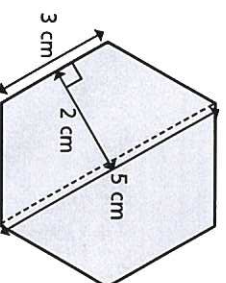
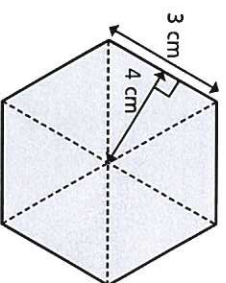
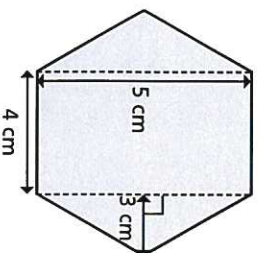
7

What fraction of the shape is shaded?



8

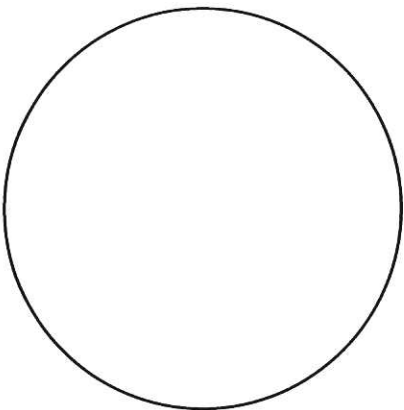
Which hexagon has the greatest area?



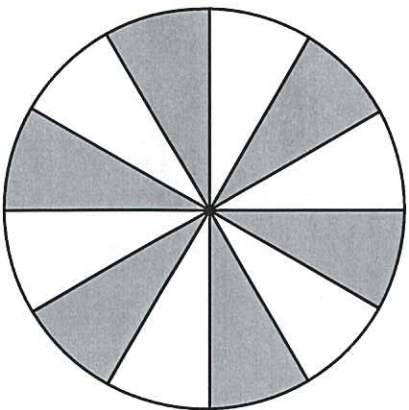
Investigate area of a circle

1

Ron is investigating how to find the area of a circle. Follow Ron's steps and do this for yourself. He draws a circle.



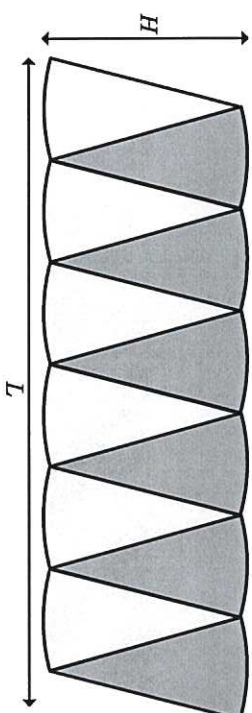
He then divides the circle into 12 equal sectors.



a) What is the angle of each sector?

 °


Ron cuts out the sections and sticks them together next to each other.



b) What is the length of the shape, marked L , approximately equal to? Tick the correct answer.

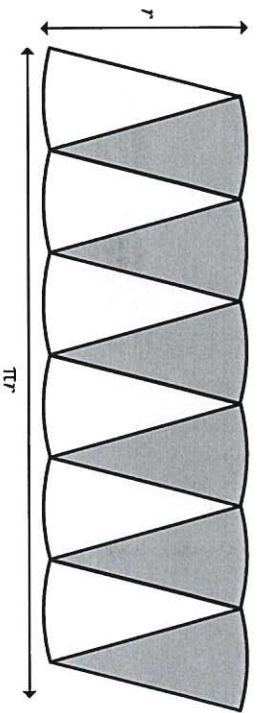
- the diameter of the circle
- the radius of the circle
- the circumference of the circle
- half the circumference of the circle

Explain your reasoning.

c) What is the height of the shape, marked H , approximately equal to? Tick the correct answer.

- the diameter of the circle
- the radius of the circle
- the circumference of the circle
- half the circumference of the circle

Ron marks these measurements on the diagram.

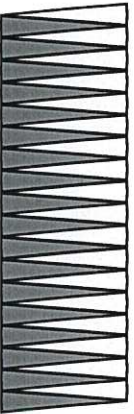
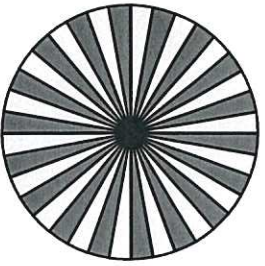


Use these measurements to explain why the area of the circle is equal to πr^2 .

2

Aisha is also investigating the area of a circle, but wants to do it more accurately.

She divides her circle into 36 sectors.

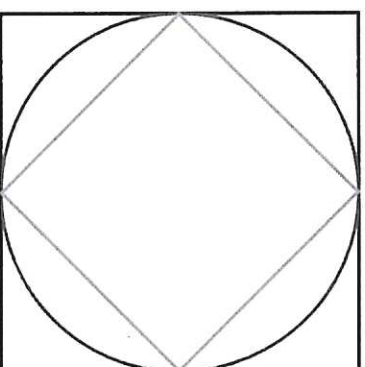


What is the same and what is different about Ron and Aisha's methods?



3

The diagram shows two squares and a circle. The area of the smaller square is half the area of the larger square.



a) Use the diagram to explain why the area of the circle must lie between $2r^2$ and $4r^2$

Compare answers with a partner.

b) How does knowing that the area of the circle lies between $2r^2$ and $4r^2$ support the fact that the area of a circle is given by $A = \pi \times r^2$?



Calculate the area of a circle and parts of a circle without a calculator

1 Find the area of each circle.

Give your answers in terms of π .

a)  b) 

area = _____ cm^2

area = _____ mm^2

2 Find the area of each circle.

Give your answers in terms of π .

a)  b) 

area = _____ cm^2

area = _____ mm^2

3 What was the same and what was different about question 1 and question 2?

Discuss it with a partner.

4 Find the area of each circle.

Give your answers in terms of π .

a) 

area = _____

b) 

area = _____

c) 

area = _____

d) 

area = _____

e) 

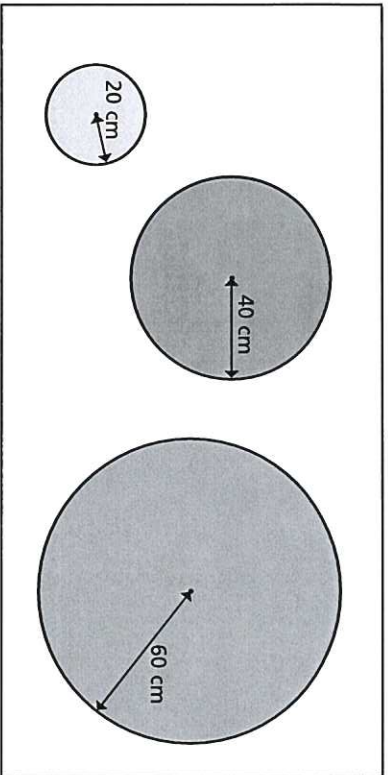
area = _____

f) 

area = _____

5

Some spots are painted on a wall.



What is the total area of the wall that is covered by paint?

Give your answer in terms of π .

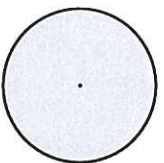
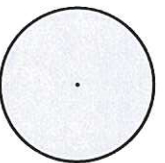
area = _____

6

a) Filip finds the area of the circle.

His answer is $64\pi \text{ cm}^2$

What is the radius of the circle?

radius = cmdiameter = mb) The area of this circle is $144\pi \text{ m}^2$

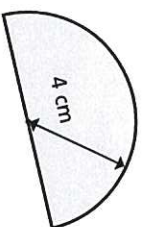
What is the diameter of the circle?

7

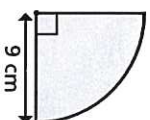
Work out the area of the parts of circles.

Give your answers in terms of π .

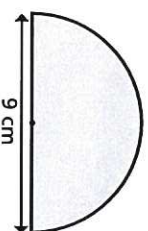
a)



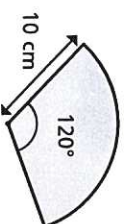
c)

area = _____ cm^2 area = _____ cm^2

b)



d)

area = _____ cm^2 area = _____ cm^2

8

The area of a semicircle is $50\pi \text{ cm}^2$

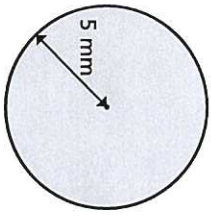
What is the radius of the semicircle?

radius = cm

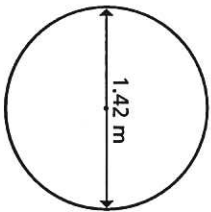
Calculate the area of a circle and parts of a circle with a calculator

1 Find the area of each circle.

Give your answers to 1 decimal place.



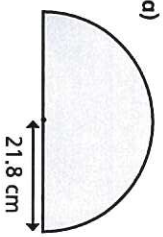
area = mm²



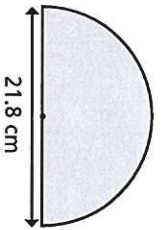
area = m²

2 Find the area of each semicircle.

Give your answers to 3 significant figures.



area = cm²



area = cm²

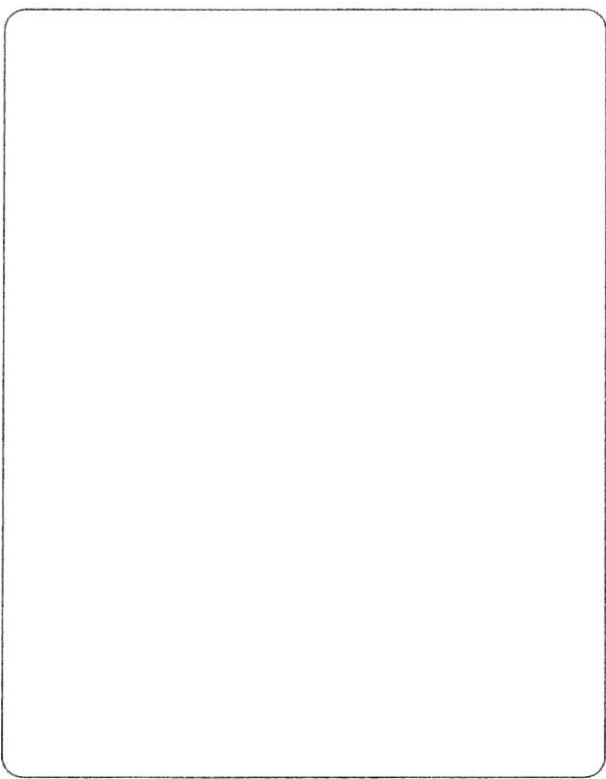
3 The area of a circle is 120 cm²

a) Find the radius of the circle.
Give your answer to 1 decimal place.

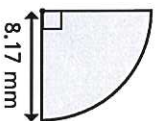
radius =

b) What is the diameter of the circle? diameter =

4 Draw a circle with an area of approximately 60 cm²



5 Find the area of the shape.



mm²

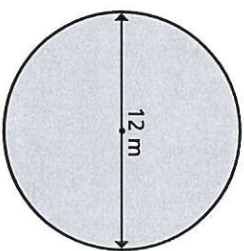
6

Ms Potter is covering a flower bed in compost.

The flower bed has a diameter of 12 m.

A bag of compost can cover 15 m² of garden.

How many bags of compost will Ms Potter need?

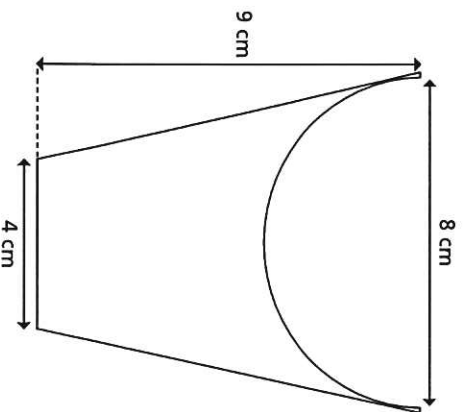


7

A semicircle has been cut from this trapezium.

Find the area of the remaining shape.

Give your answer in terms of π first and then to 3 significant figures.

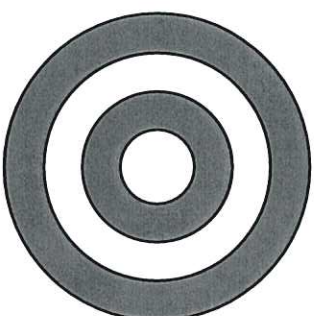


area = _____

area =

8

The diagram shows a target board used in an archery style game.



The diameters of the circles are 30 cm, 60 cm, 90 cm and 120 cm.

a) Find the area of the target that is red.

Give your answer in terms of π first and then to 3 significant figures.

area = _____

area =

b) What percentage of the target is red?

%

9

Dora and Jack are cutting shapes out of card.

Each sheet of card is 24 cm by 20 cm.

Dora cuts out the largest circle she possibly can.

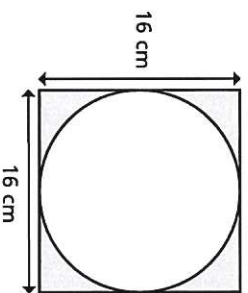
Jack cuts out the largest semicircle he possibly can.

Who has the greatest amount of card left over?

Calculate the perimeter and area of compound shapes (2)

1

A circle is drawn inside a square. Each side of the square is 16 cm.



a) What is the diameter of the circle?

Explain your reasoning.

b) What is the radius of the circle?

 cm

c) Work out the area of the circle.

Give your answer to 2 decimal places.

d) Work out the area of the shaded region.

Show all the steps in your working.

area = cm²

area = cm²

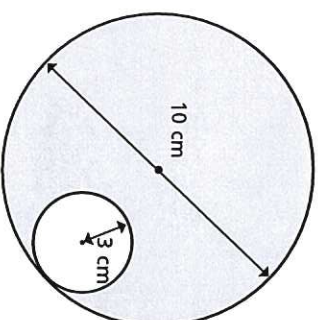
2

Work out the area of the shaded region in each shape.

Give your answers in terms of π .

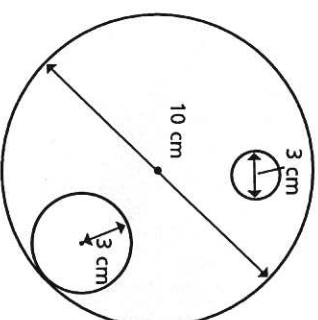
Show all the steps in your working.

a)



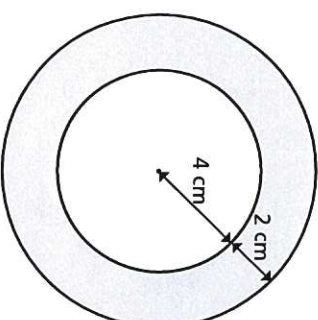
area = _____ cm²

b)



area = _____ cm²

c)



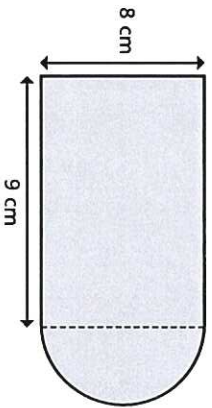
area = _____ cm²

Discuss your method with a partner.
Did you use the same method?



3

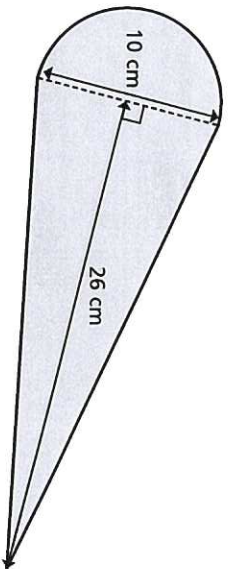
a) Divide this shape into two shapes to find its area.
Show all your workings.



b) Find the perimeter of the shape.

4

The diagram shows the layout of a field of play for a sporting event.

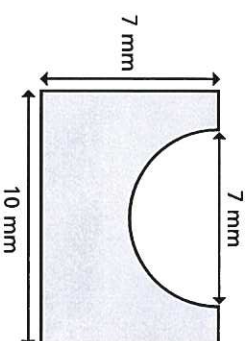


Find the area of the field of play.

area =

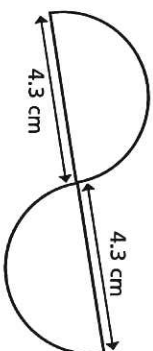
5

Work out the perimeter of the shape.
Give your answer in terms of π .



6

The diagram shows part of a children's toy.
It has been made from a single piece of wire.



Find the total length of wire needed to make the shape.

7

The diagram shows the layout of a small running track.

- Runner A runs around the inside of the track.
- Runner B runs around the outside of the track.

How much further does Runner B travel?

