THE NORTH LONDON INDEPENDENT GIRLS' SCHOOLS' CONSORTIUM

Group 1

YEAR 7
ENTRANCE EXAMINATION

MATHEMATICS

Friday 16 January 2015

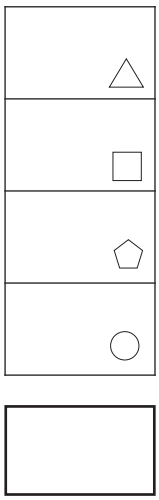
Time allowed: 1 hour 15 minutes

First Name: .....

Surname: .....

Instructions:

- Please write in pencil.
- Please try **all** the questions.
  If you cannot answer a question, go on to the next one.
- Do your rough working in the space near each question.
  Do not rub out your working as you may get marks for it.
- Calculators and rulers are NOT allowed.



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1. Work out 2357 + 3275

Answer: .....

2. Work out 7532 − 2976

Answer: .....

3. Work out 683 × 7

Answer: .....

4. Work out 2964 ÷ 6

Answer: .....

5. (a) Which number is 100 times smaller than 56.9?

Answer: .....

(b) Which number is 10 more than one thousand nine hundred and ninety seven?

Answer: .....

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6. When two of the numbers below are added together, the answer is also a square number.
Write down the calculation.

16 25 36 49 64

Answer: ..... + ... = ...

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7. Work out $\frac{3}{8}$ of 72

Answer: .....

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8. Circle the number that will be in the middle when the numbers below are written in size order.

0.63 0.06 0.4 0.603 0.64

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9. Write a number in each box to complete the number sequence.

100 93 ☐ 82 78 ☐



10. Janet has written down two numbers.

When she subtracts the smaller number from the larger one, the answer is 7

When she multiplies the two numbers together, the answer is 60

Which two numbers has Janet written down?

Answer: ..... and .....

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11. Write the missing numbers in the boxes to make the calculations correct.

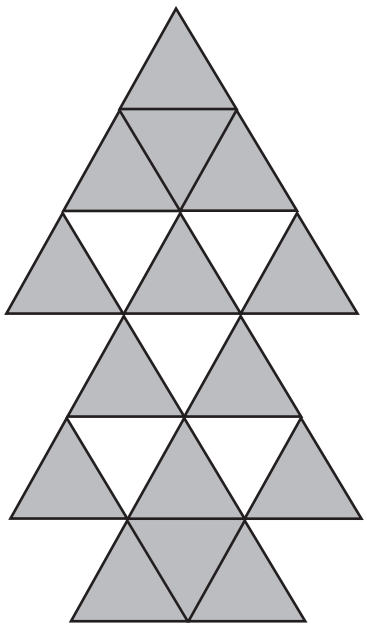
(a) $7 \times 9 - \square = 25$

(b) $64 \div 4 = \square + 7$

(c) $6^2 = 4^2 + (2 \times \square)$

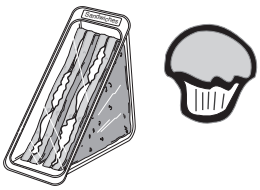
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12. What percentage of the shape below is shaded?



Answer: .....%

13. Emily bought a sandwich and a muffin from the cafe.
She paid for these with a £10 note, and received £4.36 change.



Given that the sandwich cost £3.85, how much did the muffin cost?

Answer: £ .....

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14. The temperature in Minnesota on Monday morning was $^{-}4$°C.
On Tuesday morning, the temperature was 6 degrees colder.



(a) What was the temperature on Tuesday morning?

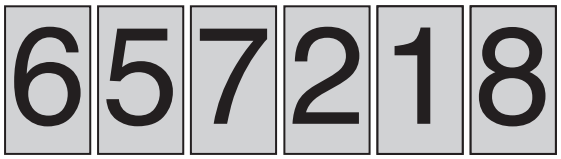
Answer: ..... °C

On Wednesday the temperature was 5°C.

(b) How many degrees warmer was it on Wednesday than on Monday?

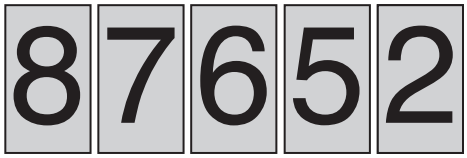
Answer: ..... degrees

15. Sam has the six number cards shown below.



The cards can be placed together to form different numbers.

For example, using just five of the cards, the largest 5-digit number that can be made is 87652



(a) Using all six cards, what is the largest even number which can be made?

Answer: .....

(b) Using any number of the cards, what is the largest multiple of 5 that can be made?

Answer: .....

(c) What is the smallest 4-digit multiple of 6 that can be made?

Answer: .....

(d) What is the difference between the largest and smallest 4-digit numbers that can be made?

Answer: .....

16. Below are the instructions for *Kleeno*, a new kitchen disinfectant.

Instructions
Mix 20 ml of *Kleeno* with 4 litres of water

A bottle of *Kleeno* contains 540 ml.

(a) How many 20 ml portions of *Kleeno* are contained in one bottle?

Answer: .....

(b) How much *Kleeno* needs to be added to a bucket containing 10 litres of water?

Answer: ..... ml

Maria uses 6 litres of water every time she cleans her kitchen.
She cleans her kitchen every day except for Sunday.

(c) For how many weeks does a bottle of *Kleeno* last her?

Answer: ..... weeks

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17. Becca is thinking of a prime number bigger than 20
When she writes its digits in reverse order, the new number is also prime.

What is the smallest number Becca could be thinking of?

Answer: .....

18. Given that **51 × 48 = 2448** work out each of the following:

(a) 51 × 24

Answer: .....

(b) 52 × 48

Answer: .....

(c) 0.51 × 4.8

Answer: .....

(d) 24.48 ÷ 4.8

Answer: .....

---

19. 3 friends buy a bag containing a number of sweets.
Georgia first takes one quarter of the sweets in the bag.
Hattie and Imogen then equally share the sweets that are remaining in the bag.

(a) If Hattie has 12 sweets, how many sweets did Georgia take?

Answer: .....

(b) What fraction of the sweets in the full bag does Imogen have?

Answer: .....

20. David wants to buy 1 kilogram of Ethiopian coffee.

He usually buys 250 g bags, which cost £3.90 each.

However, he notices that the shop has a special offer on 100 g bags. Each bag costs £1.85, but for every two bags you buy, you get a third bag free.

How much does David save by buying 1 kilogram of coffee in 100 g bags rather than in 250 g bags?



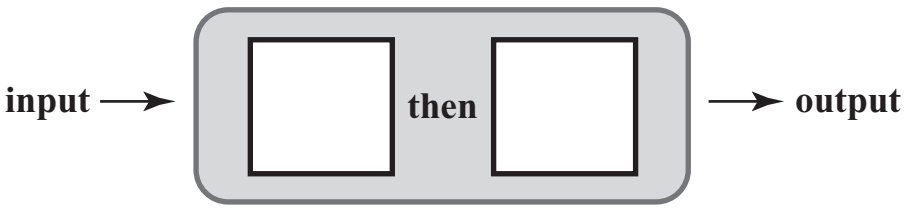
Answer: £ .....

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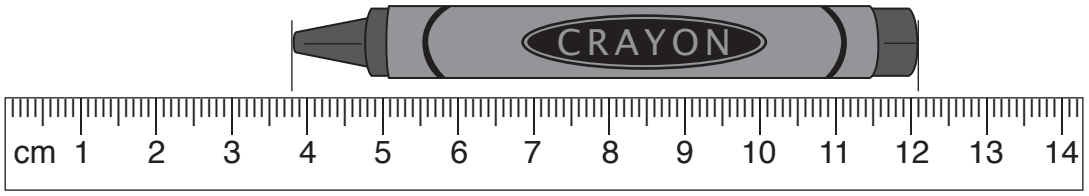
21. A number machine has produced the following table of input and output numbers.

input	output
-1	1
0	1.5
2	2.5
5	4

Write suitable labels on the diagram below.



22. (a) Use the ruler to work out the length of the crayon in centimetres.



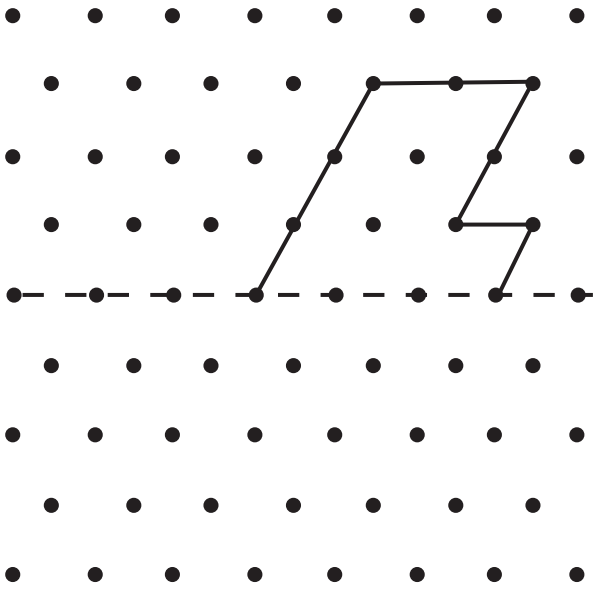
Answer: ..... cm

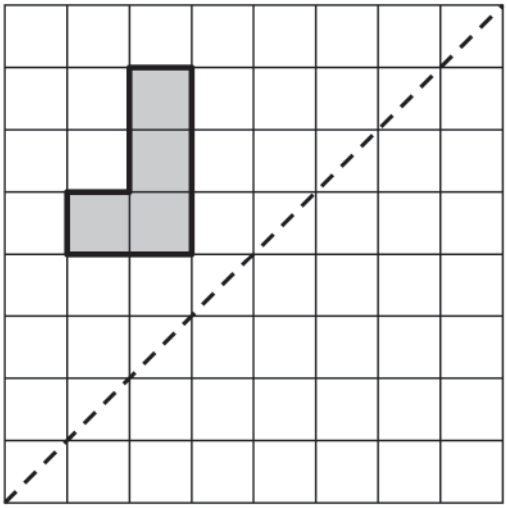
(b) What is the length of the crayon in millimetres?

Answer: ..... mm

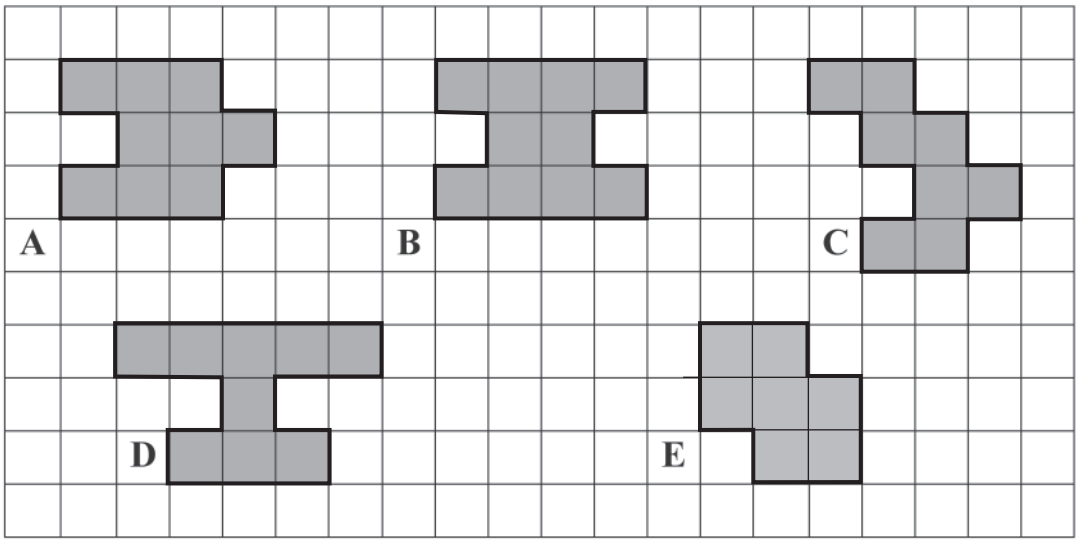
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23. Reflect each shape in the dashed line shown.





24. Shapes A, B, C, D and E are drawn on the grid below.



(a) Which shape has the smallest area?

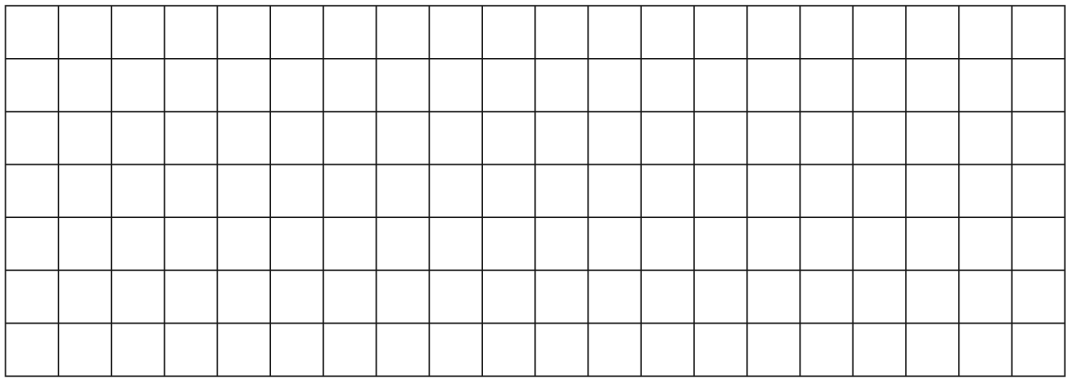
Answer: .....

(b) Which shape has the longest perimeter?

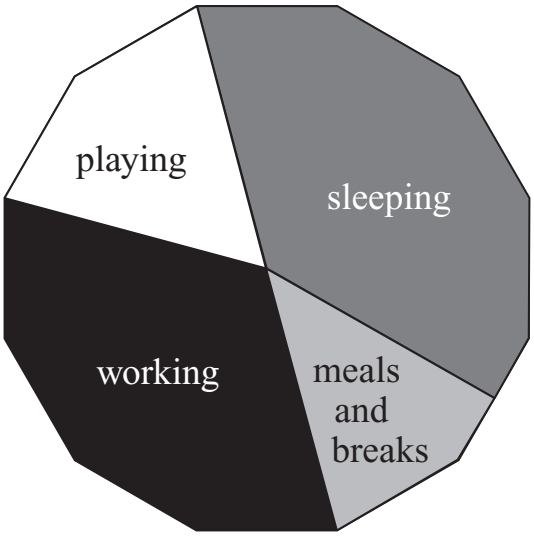
Answer: .....

(c) Draw all the lines of symmetry on each shape.

(d) On the grid below, draw a quadrilateral with an area of 10 squares which has exactly one line of symmetry.



25. The chart below shows the way Rebecca spends her 24-hour day.



(a) How many hours does Rebecca spend sleeping?

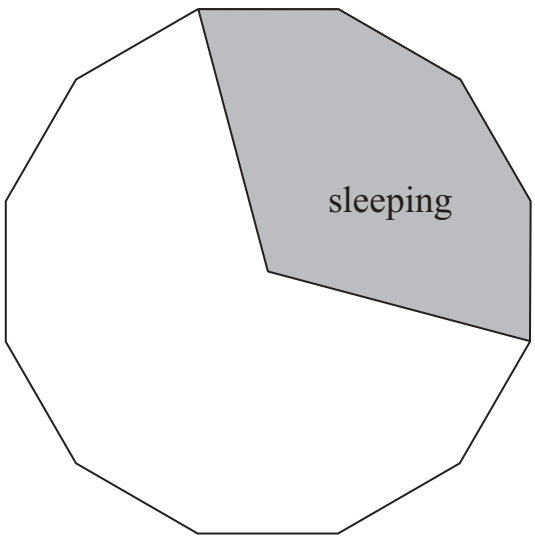
Answer: ..... hours

(b) What fraction of the 24 hours does Rebecca spend working?

Answer: .....

Jamie provides the information below about the way his 24-hour day is spent.

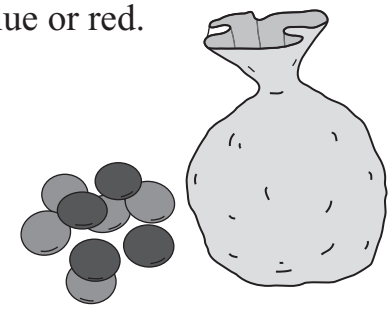
sleeping	8 hours
working	6 hours
relaxing	3 hours
other activities	7 hours



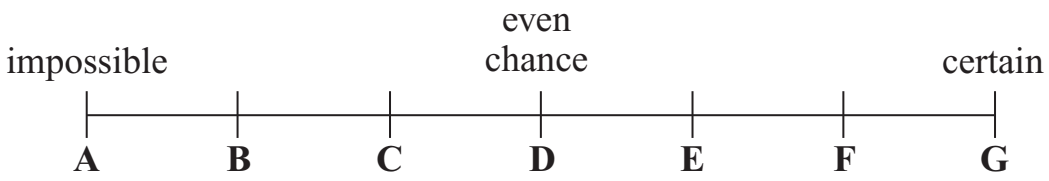
(c) Complete the chart to show how Jamie spends his 24-hour day.

26. Petra has a bag containing 24 counters which are green, blue or red.

- 50% of the counters are green.
- There are twice as many blue counters as red counters in the bag.



She picks one counter at random from the bag.



From the probability scale shown, write down the letter which represents the probability that her counter is

(a) green

Answer: .....

(b) not blue

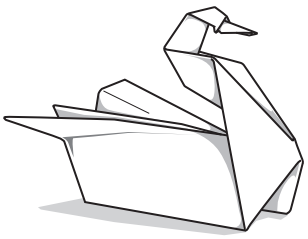
Answer: .....

(c) yellow

Answer: .....

27. Yoshi is making origami models.

The time taken to make each model is shown below.



model	time taken
swan	5 minutes 20 seconds
fish	4 minutes 44 seconds
boat	2 minutes 3 seconds
horse	8 minutes 17 seconds

(a) Work out the total time that Yoshi takes to make the 4 origami models.

Answer: ..... min ..... s

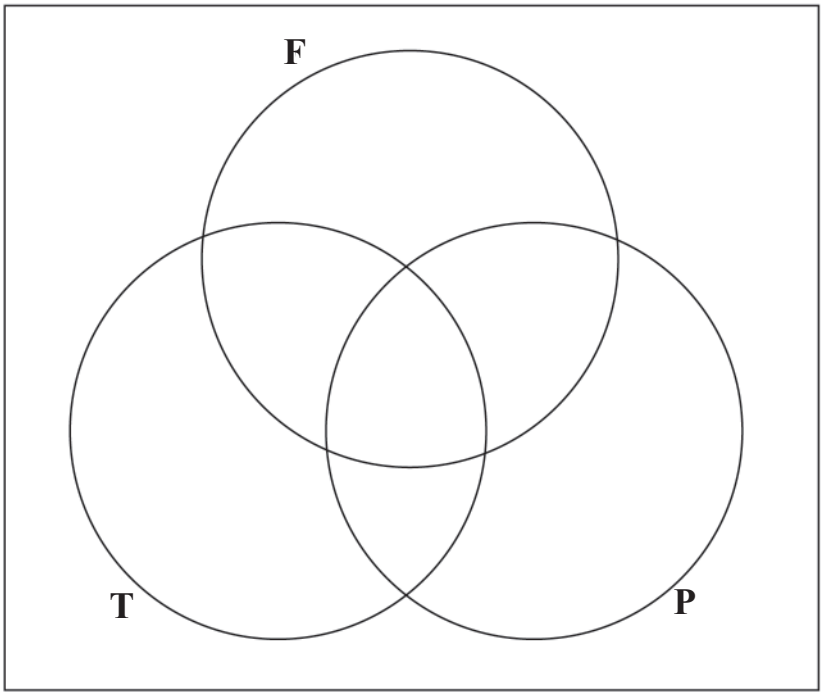
(b) What is the mean (average) time taken to create one origami model?

Answer: ..... min ..... s

(c) What is the range of times that Yoshi takes to make an origami model?

Answer: ..... min ..... s

28. Greta is sorting quadrilaterals using a Venn Diagram.



Circle **F** contains shapes with 4 equal sides.

Circle **T** has all shapes with 2 pairs of parallel sides.

Circle **P** has all shapes with at least 1 pair of perpendicular sides.

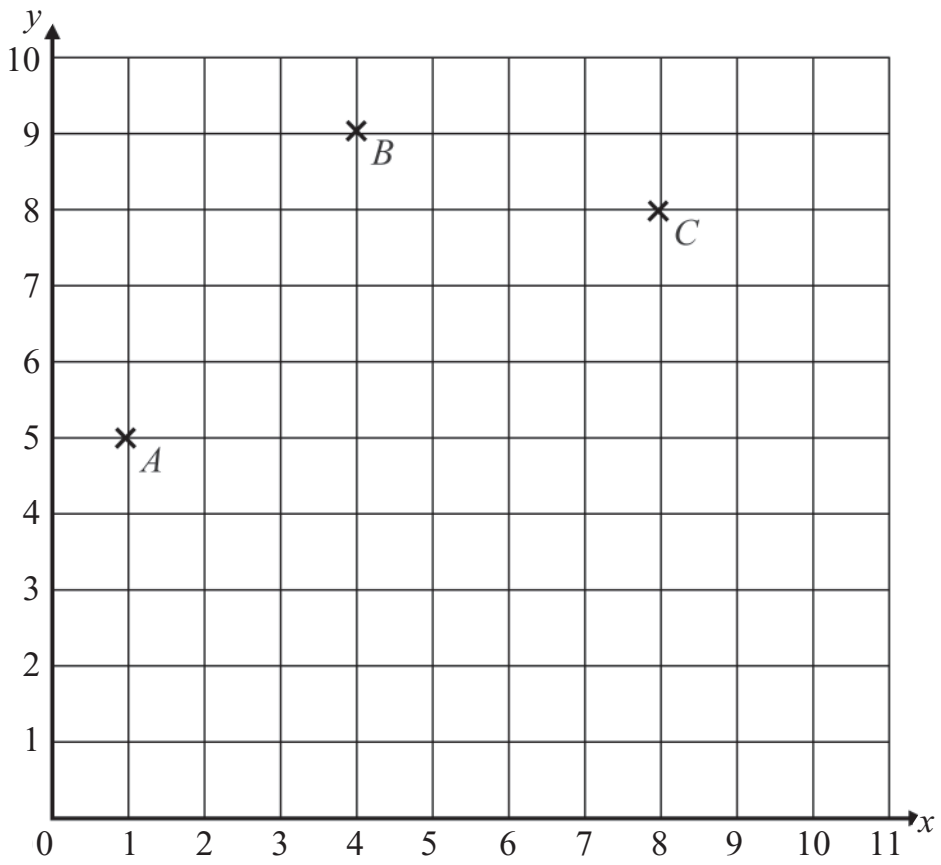
(a) Write 'R' on the Venn Diagram to show where Greta should place a rhombus.

(b) Write 'K' on the Venn Diagram to show where Greta should place a kite.

(c) Name a quadrilateral that should be placed in the very centre of the Venn diagram.

Answer: .....

29. Points *A*, *B* and *C* have been plotted on the centimetre square co-ordinate grid below.



There is a point, *D*, such that when *A*, *B*, *C* and *D* are joined in order, they form a parallelogram.

(a) Plot point *D* and draw the parallelogram *ABCD*.

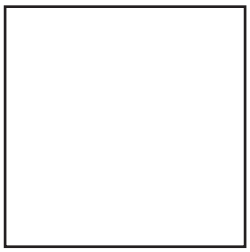
(b) Write down the co-ordinates of point *D*.

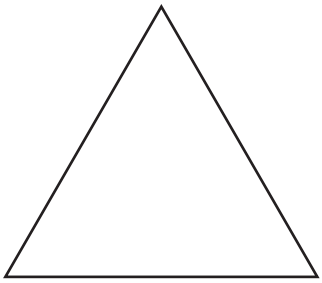
Answer: (..... , ...)

(c) Calculate the area of *ABCD*.

Answer: ..... cm^2

30. A square and equilateral triangle have the same perimeter.

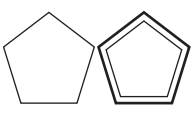




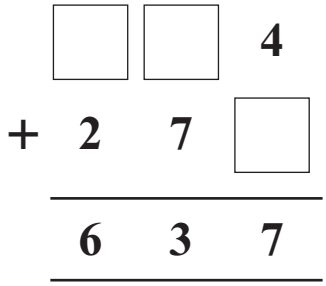
not to scale

Given that the area of the square is 36 cm^2, work out the length of one side of the equilateral triangle.

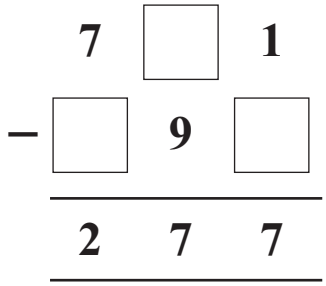
Answer: ..... cm



31. Write a digit in each box to make the calculations correct.



$$\begin{array}{r} \square\ \square\ 4 \\ +\ 2\ \ 7\ \square \\ \hline 6\ \ 3\ \ 7 \end{array}$$



$$\begin{array}{r} 7\ \square\ 1 \\ -\ \square\ 9\ \square \\ \hline 2\ \ 7\ \ 7 \end{array}$$

32. Anna's Aquarium has only two types of creature: jupiterian jellyfish and ordinary octopus.

Each jupiterian jellyfish has 25 tentacles.

Each ordinary octopus has 8 tentacles.

In Anna's Aquarium, there are 20 creatures and 279 tentacles.

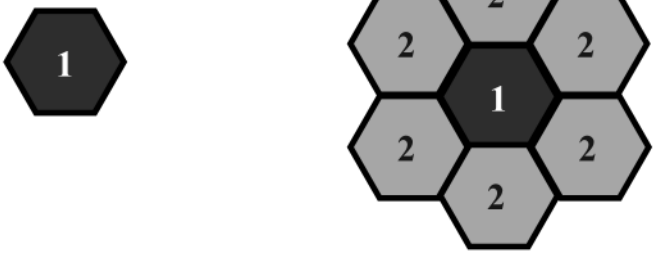
How many jupiterian jellyfish are there in the aquarium?

Answer: .....

33. The pattern below is made from tesselating regular hexagons.

To get the next pattern, an extra 'ring' of hexagons is added to completely surround the previous pattern.

pattern 1 pattern 2



not to size

The length of each side of a hexagon is 3.5 cm.

(a) What is the perimeter of pattern 1?

Answer: ..... cm

(b) What is the perimeter of pattern 2?

Answer: ..... cm

Pattern 3 will contain a third ring of hexagons.

(c) How many hexagons will there be **altogether** in pattern 3?

Answer: .....

(d) What is the perimeter of pattern 3?

Answer: ..... cm

34. Four girls are standing in line: Wendy, Xanthe, Yana and Zoe.

Wendy thinks of a number and whispers it to Xanthe.

Xanthe subtracts five from this number and whispers the result to Yana.

Yana multiplies the result by two and whispers her result to Zoe.

Zoe adds ten to the number she has heard from Yana, and then calls out her result.

For example: If Wendy thinks of 8, Xanthe whispers 3 to Yana. Yana then whispers 6 to Zoe, who then calls out 16

(a) If Wendy thinks of 10, which number does Zoe call out?

Answer: .....

(b) If Zoe calls out 4, which number did Wendy think of?

Answer: .....

(c) If Yana whispers 3 to Zoe, which number did Wendy think of?

Answer: .....

(d) If Zoe calls out the same number as the one Wendy thought of, which number must that be?

Answer: .....

(e) If Wendy thought of 6, but Zoe called out 18, something has gone wrong!

(i) If it was Xanthe who misheard Wendy, what number did Xanthe think she heard?

Answer: .....

(ii) If Xanthe heard Wendy correctly and it was Zoe who made a mistake by adding the wrong amount, what did Zoe add by mistake?

Answer: .....

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35. There are patterns made by some of the multiples of 37

$3 \times 37 = 111$
$6 \times 37 = 222$
$9 \times 37 = 333$ and so on

Use these results to work out

(a) 15×37

Answer: .....

(b) 24×37

Answer: .....

(c) $(27 \times 37) \div 2$

Answer: .....

(d) 26×37

Answer: .....

36. To find the digital root of a number, you add the digits repeatedly until you reach a single digit number.

For example, the digital root of 169 is 7 because $1 + 6 + 9 = 16$, and $1 + 6 = 7$

The digital roots of the first 9 square numbers are given in the table below:

	1^2	2^2	3^2	4^2	5^2	6^2	7^2	8^2	9^2
square number	1	4	9	16	25	36	49	64	81
digital root	1	4	9	7	7	9	4	1	9

(a) Complete the table of digital roots of the next nine square numbers.

	10^2	11^2	12^2	13^2	14^2	15^2	16^2	17^2	18^2
square number	100	121	144	169	196	225	256	289	324
digital root				7					9

(b) What patterns do you notice in the digital roots in the tables above?

Answer: .....

.....

(c) Using the patterns you have spotted, write down the digital roots of the following numbers:

(i) 19^2

Answer: .....

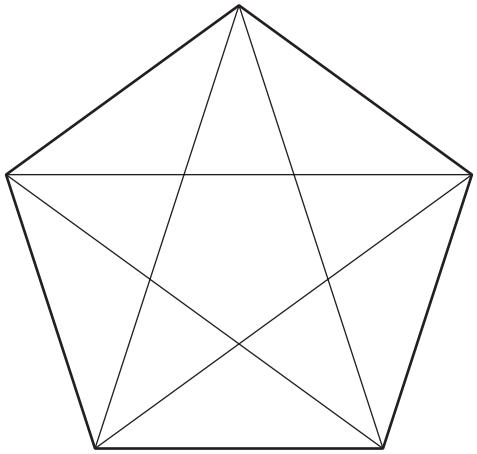
(ii) 29^2

Answer: .....

(iii) $999\ 999^2$

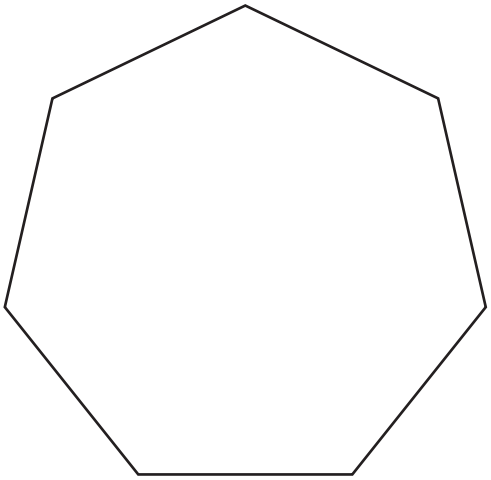
Answer: .....

37. Quinn drew a regular pentagon and ruled in all of its diagonals.



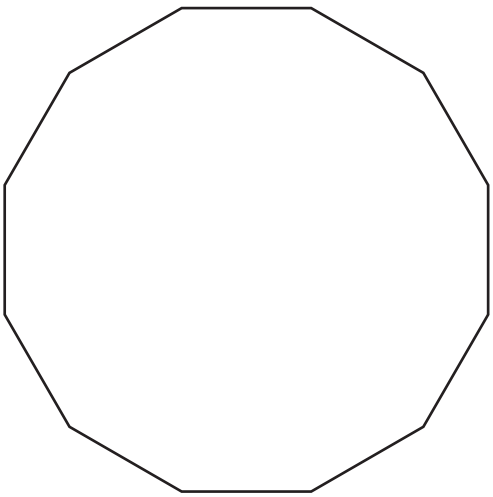
He discovered that a regular pentagon has 5 diagonals.

(a) How many diagonals has a regular heptagon (7 sides)?



Answer: .....

(b) How many diagonals has a regular dodecagon (12 sides)?



Answer: .....

38. On planet Dichrome, the symbol ◈ has a special meaning in arithmetic.

g ◈ h means multiply g by 5, then subtract 2 times h.

For example, $3 ◈ 4 = 3 \times 5 - 2 \times 4$
$= 15 - 8$
$= 7$

(a) Work out $4 ◈ 3$

Answer: .....

(b) Work out the value of $\boldsymbol{k}$ so that $\boldsymbol{k} ◈ 3 = 29$

Answer: .....

It is possible to use the symbol twice in a calculation.

For example, $4 ◈ (2 ◈ 1) = 4 ◈ (2 \times 5 - 2 \times 1)$
$= 4 ◈ 8$
$= 4 \times 5 - 2 \times 8$
$= 4$

(c) Work out $5 ◈ (4 ◈ 3)$

Answer: .....

(d) Work out the value of $\boldsymbol{t}$ so that $(6 ◈ \boldsymbol{t}) ◈ 4 = 12$

Answer: .....

(Total: 100 marks)