ALDERLEY EDGE
SCHOOL FOR GIRLS

11+ Entrance Examination
Tuesday 7 January 2020
MATHEMATICS PAPER

Time allowed: 1 hour
Calculators are *not* allowed
Write your candidate number in the box below:

CANDIDATE NUMBER

_____

- There are **two sections** to this paper.

- Section A: Multiple choice questions. For each question use pencil to put a circle around the correct answer. If you make a mistake, rub it out and circle the correct answer. You should spend no more than 25 minutes on this section.

- Section B: The second section contains questions where you may need to show your methods and your working out. The last question is a puzzle-type question. If you finish this section, you may go back to the earlier section if you need to.

Results:

Section A	/ 25
Section B	/ 50

Section A

You may use rough paper for working out but this will not be marked. Only the answers you circle will be marked.

For each question, circle the correct answer in pencil.

1.

In figures, what is the number ten thousand and twenty?

    A 1 000 020   B 1 020   C 10 020   D 10 200

2.

Bill thinks of a number. Half of his number, plus three, is 18.
What number did Bill think of?

    A 12   B 33   C 30   D 7½

3.

Find 5% of 360 kg

    A 36 kg   B 1800 kg   C 355 kg   D 18 kg

4.

How many 6cm pieces of string can be cut from a piece of string 52 cm long?

    A 6   B 7   C 8   D 9

5.

Jim has 28 marbles. He gives $\frac{1}{4}$ of them to Pam and a third of the rest to Bill.
How many are left?

    A none   B 2   C 12   D 14

6.

What is 2p + 5p – p + 4p?

    A 11   B 10p   C 7 + 4p   D It depends on p

7.

x stands for the number 5. Which is bigger: 3x - 2 or 2x + 3?

    A the same   B can't tell   C 3x - 2   D 2x + 3

8

Will the number 72 ever appear in the pattern   12,   16,   20,   24…   ?

    A   sometimes   B   always   C   never   D   not enough information

9

What number must x be if $5x - 1 = 2x + 5$?

    A $x = 1$ B $x = 2$ C $x = 3$ D $x = 4$

10

Will the number 38 occur in *both* of these number patterns?

      5,   8,   11,   14…   and   3,   8,   13,   18…

    A   not enough information   B   yes, at the same position in the pattern

    C   yes, in different positions   D   no
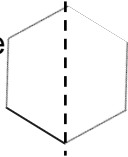
11

How many lines of symmetry has a rectangle?

    A   4   B   2   C   1   D   0

12

Beth cuts out this regular hexagon and folds it along the dotted line

What shape has she made?

    A   rhombus   B   kite   C   trapezium   D   rectangle

13

Two angles of a triangle are 45° and 55°. The third angle is:

    A   45°   B   80°   C   100°   D   none of these

14

A square has a side of length 4 cm. A rectangle has sides of length 8cm and 2cm. Which has the largest area?

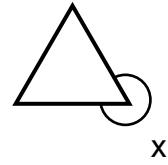   A   both the same   B   the square

    C   the rectangle   D   not enough information

15

The diagram shows an equilateral triangle.

What is the size of the angle marked x?

A 300°   B 60°   C 120°   D 180°   x

16

Twelve people were asked for their favourite colours. Three of them said 'blue'.

What angle would that be represented by on a pie chart?

A 3°   B 12°   C 45°   D 90°

17

5 miles is the same as 8 km. How many km is 40 miles?

A 25 km   B 40 km   C 80 km   D 64 km

18

4 girls have an average height of 1·4m. A boy joins them and the average rises to 1·42m. This means that:

A he is taller than all of the girls B he is smaller than all of the girls

C he is taller than at least one of the girls   D none of these

19

What is the *mean* of these numbers?   0   0   1   1   3   3   4   4

A 2   B 4   C 8   D 16

20

In a hockey match the half-time score was Reds 2, Blues 1. Seven goals were scored in the second half. Which one of the following could *not* have been the final result?

A Reds won by 2 goals   B Match drawn

C Blues won by 2 goals   D Blues won by 1 goal

21

Sophie's calculator is broken; the + and the × buttons are the wrong way round! What answer does she get if she types in 5 + 4 × 2?

A 13   B 18   C 22   D 30

22

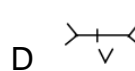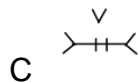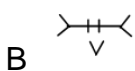What is $5 \times 4 \times 3 \times 2 \times 1 \times 0$?

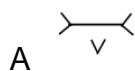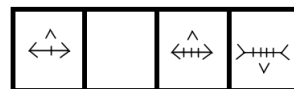   A 120   B 15   C 0   D none of these

23

Which one of shapes A, B, C or D is the missing shape?

A   B   C   D

24

In this question $a \oplus b$ means $a \times b + a + b$. For example, $3 \oplus 4 = 3 \times 4 + 3 + 4 = 19$.
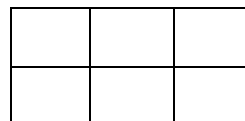
What is $5 \oplus 2$?

   A 25   B 19   C 17   D 59

25

How many rectangles, of whatever size, are in the diagram?

   A 18   B 12   C 7   D 6

Section B

Answer in the spaces provided.

1. Work out   547 + 385

2. Work out   3245 - 2354

3. Work out   392 ÷ 7

4. Work out   48 × 8

5. Find 30% of £80

6. Work out $\frac{3}{7}$ of £28

7. Fill in the missing number to make this calculation correct:

$$23 \times \boxed{} = 690$$

8. Arthur records the lowest temperatures on each day of one week in December. On Monday the lowest temperature was –3.

On Tuesday it was 8°C higher than on Monday.
On Wednesday it had fallen 7°C from Tuesday.
On Thursday it rose by 6°C from Wednesday's figure.

What was the lowest temperature on Thursday?

9. Jill thinks that   5 + 4 × 3 = 27

She writes:

5 + 4 = 9, and 9 × 3 = 27

Jill is wrong. Explain what Jill has done wrong

10. Find the **mean** of the numbers 3, 4, 6 and 11

11. Karen is facing West. She turns clockwise by $\frac{3}{4}$ of a turn. In which direction is she facing now?

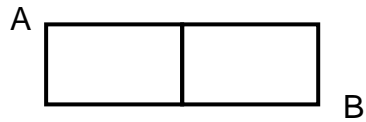**12.** Write these decimals in order, starting with the smallest:

3.25   2.8   3.4   3.161

13. I think of a number. A quarter of my number is 8. What is my number?

14. Sammy the Spider wants to crawl along the lines from A to B in the shortest way possible. He may only move in two directions: to the right and downwards.
In how many different ways can he do this?

A
B

15. Ruby goes shopping. She buys 4 pencils and 5 pens.

Each pencil costs 12p. Each pen costs 16p.

How much does Ruby spend? Give your answer in pounds and pence.

16. Three of these decimals on the left match up to fractions on the right.

One of them doesn't. Correctly match up the three that do.

0.5 $^1/_4$
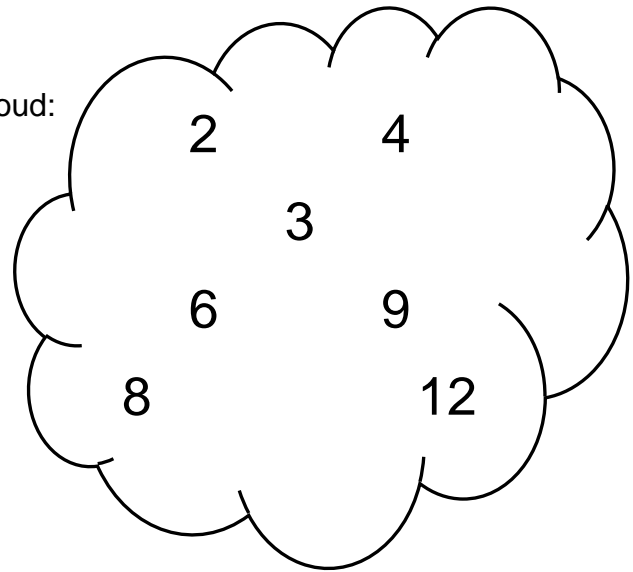
0.25 $^1/_2$

0.3 $^3/_4$

0.75 $^1/_3$

For Q 17 – 21 choose numbers from this cloud:

2   4
3
6   9
8   12

17. Find two numbers with a sum of 12 and a difference of 6:

18. Find a number that is *not* a factor of 24.
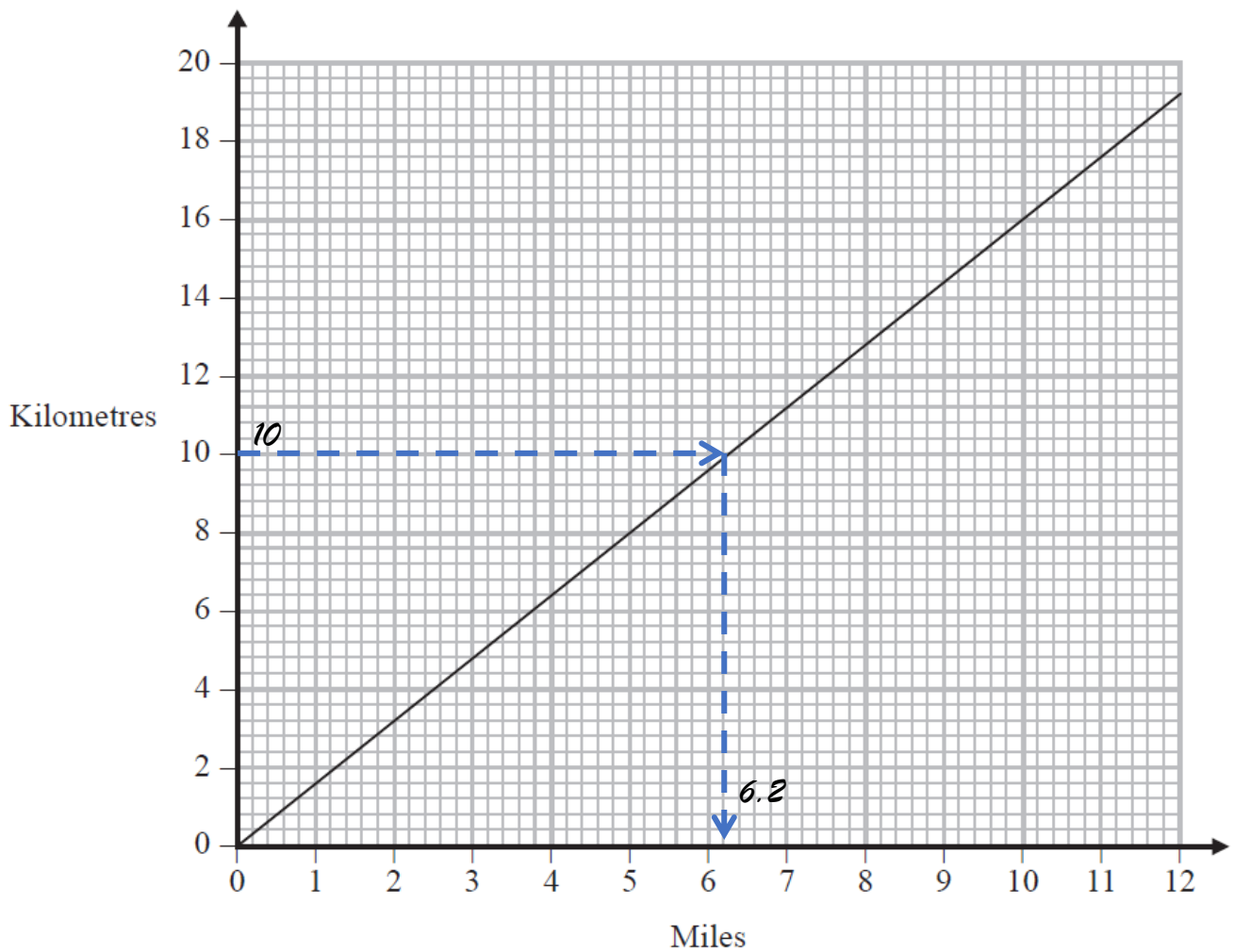
19. Fifteen is a multiple of one of these numbers. Which one?

20. Place **the same number in both** boxes to make the calculation correct.

$$9 \times \boxed{} = 12 + 5 \times \boxed{}$$

21. Use **three different numbers** from the cloud to make this statement correct:

$$\boxed{} - 3 = \boxed{} + \boxed{}$$

**22.** You can use this graph to convert between miles and kilometres.

a) Kathy wants to change 10 miles to kilometres.

   She says that 10 miles is about 6.2km.

   She drew dotted lines and numbers on the graph to help her find this.

   Kathy is wrong! What has Kathy done wrong?

b) Use the graph to change 10 miles to kilometres correctly.

c) How many miles would 24km be?

23. Below are three points plotted on a graph.
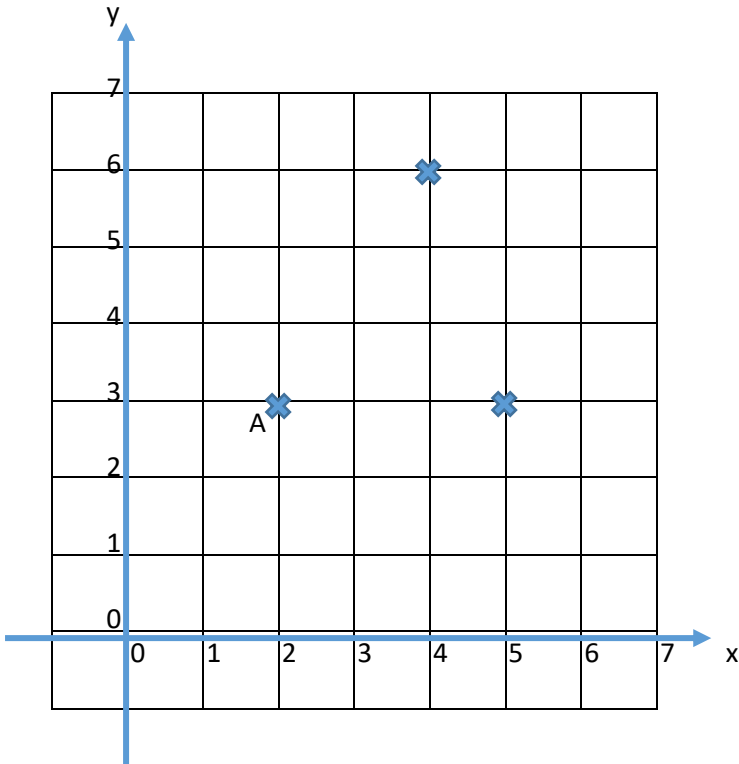
a) What are the coordinates of point A?   (,   )

b) Jemima plots a fourth point to make a parallelogram. Put a cross on the graph where Jemima's point could be. Label your point **P**.
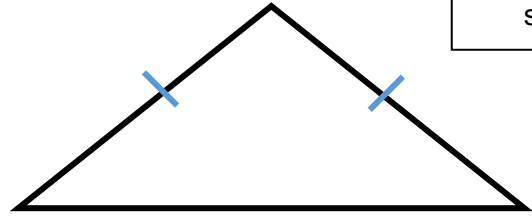
c) Kate thinks she can plot a *different* point that would also make a parallelogram. What could the coordinates of Kate's point be?
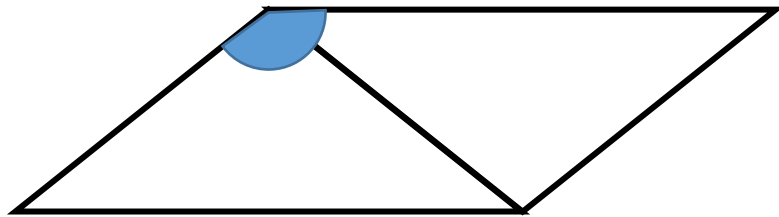
                                                        (,   )

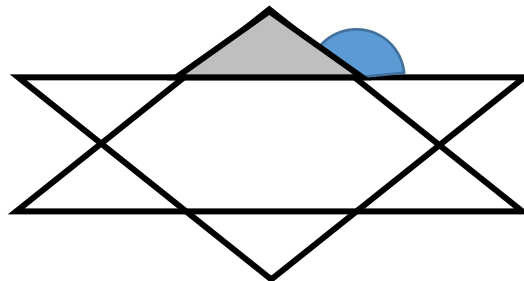**24.** An isosceles triangle has two equal angles of 42°.

a) What is the size of the third angle?

b) Two of these triangles are joined together as shown.
What is the size of the angle marked?

c) Two of these triangles are overlapped. The shaded triangle is the same shape as
the original triangle, but a different size. What is the size of the angle marked?

25. Simone buys a chocolate bar for 73p from her local shop. She pays with a £1 coin.
The shopkeeper gives her the change using **exactly** 5 coins.
There are three possible ways of doing this. Find two of them.

------ p   -------p   ------ p   ------ p   -------p

or

------ p   -------p   ------ p   ------ p   -------p

26. Clemmie notices an interesting pattern using the two numbers 7 and 3.

She notices that these two calculations give the same answer:

$7^2 - 3^2 = 49 - 9 = 40$ and $(7 - 3) \times (7 + 3) = 4 \times 10 = 40$

She tries it again with the numbers 8 and 2.

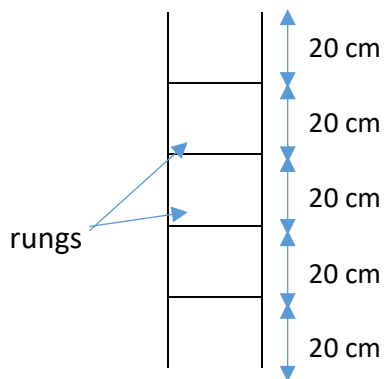$8^2 - 2^2 = 64 - 4 = 60$ and $(8 - 2) \times (8 + 2) = 6 \times 10 = 60$

It still works!

a) Show that Clemmie's pattern works for the numbers 6 and 4.

b) In fact, Clemmie's method will work for *any* two numbers.

Use this fact to find a *quick* way to work out $23^2 - 13^2$.

27. Bev has three ladders (Small, Medium and Large). Each has gaps at the top, bottom and between the rungs of 20cm.

20 cm

20 cm

20 cm

20 cm

20 cm

rungs

Bev's Small ladder (shown) has 4 rungs.

It is 1 metre long.

a) Bev's Medium ladder has 8 rungs. How long is this ladder?

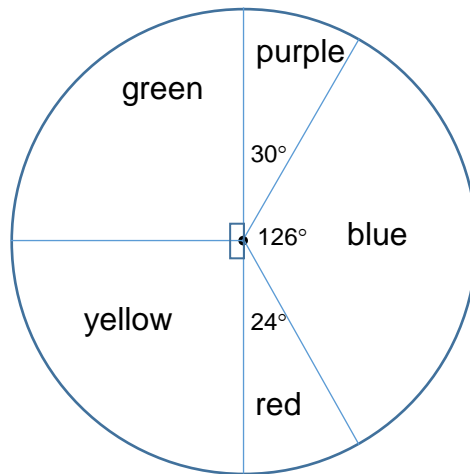b) If Bev's Long ladder is 3.2 metres long, how many rungs will it have?

28. Felicity makes bracelets by threading three beads onto a string:

How many different looking bracelets can Felicity make if she uses the three beads shown?

29. Here is a pie chart showing the favourite colours of children in Year 6.
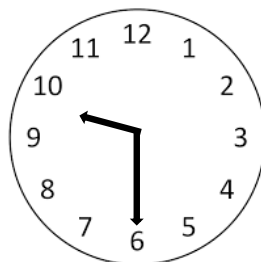The angles used to draw the pie chart are shown.

Five children chose purple as their favourite colour.
How many children are in Year 6?

30.

a) My train is at 9:15 am. It takes me 28 minutes to walk to the station.
What is the latest time I can set off to walk to the station?

b) In fact, I arrive late and miss the train. The station clock shows this time:

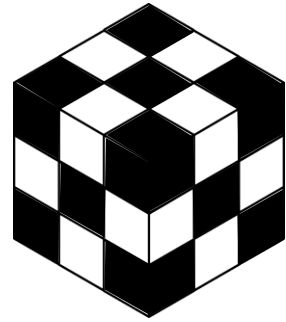What is the angle between the hour hand and the minute hand?

31.

a) The picture shows a cube.

Each side of the cube is 3cm long.

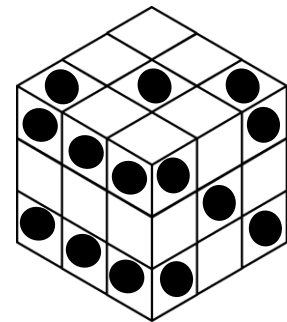Each face is coloured black and white.

All faces are coloured in the same way.

What fraction of the surface of the cube is coloured black?

A different 3cm cube is made into a dice by sticking spots on the small squares that make up the faces of the cube.

The picture shows the 6, 5 and 3 sides of the cube.

b) How many spots will be on the cube altogether?

c) What fraction of the small squares will have a dot on them?

32. A pattern is produced from circles. Each circle is either black or white.

The colour of a circle depends on the two circles immediately above it.

If two adjacent circles on the same row are **the same** colour, the circle below is white.

○ ○ ← same colour   same colour → ● ●
  ○ ← circle below   circle below → ○
       is white   is white

If two circles on a row are **different** colours, the circle below is black.

○ ● ← different colours   different colours → ● ○
  ● ← circle below   circle below → ●
   is black   is black
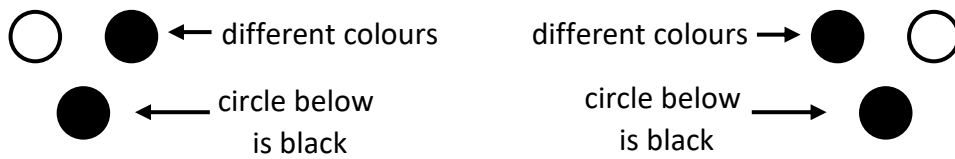
a) The first two rows of Pattern 1 show the circles coloured in black or white.

The next two rows have not been coloured in.

These circles are shown as dotted: ⊙

Complete the next two lines of the pattern; colour in the circles if they should be black, or leave them blank if they should be white.

○ ○ ● ● ○ ●
  ○ ● ○ ● ●   Pattern 1
    ⊙ ⊙ ⊙ ⊙
      ⊙ ⊙ ⊙
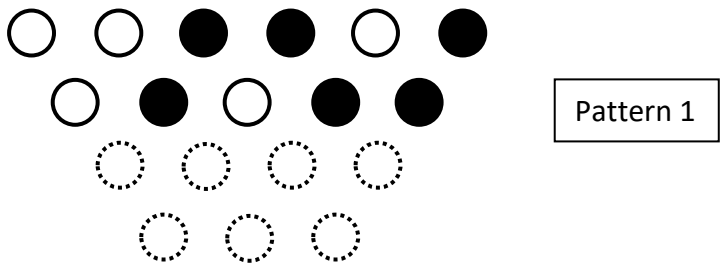
b) Pattern 2 shows the bottom row and part of the row above coloured in.

Complete the top two rows of the pattern.

⊙ ● ⊙
  ○ ⊙   Pattern 2
    ●
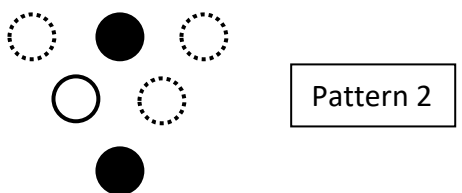
c) Melissa starts to complete pattern 3.

She has coloured one of the circles on the second row incorrectly.

Put a cross through the circle she has coloured incorrectly.

○ ● ● ○ ○
  ○ ○ ● ○   Pattern 3