11+ Entrance Examination
Wednesday 5 January 2022
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.

  The first section is made up of 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 around 20 minutes on this section.

  As soon as you have finished this section, or after 20 minutes, you should move on to the second section.

  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.

Do not write in this area.

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.

Which of these numbers is both a factor of 24 and a multiple of 6?

A 12   B 3   C 4   D 18

2.

What is 28 less than 52?

A 36   B 80   C 26   D 24

3.

Jess is thinking of a number. If she doubles it and adds 5, her answer is 27.
What number was Jess thinking of?

A 11   B 17   C 22   D 59

4.

Here is a sum. Two of the digits have been covered up by letters $\boxed{X}$ and $\boxed{Y}$.
What digit is covered up by $\boxed{X}$?

$$
\begin{array}{r}
2\ 4 \\
+\ 3\,\boxed{X}. \\
\hline
\boxed{Y}\,3
\end{array}
$$

A 1   B 7   C 9   D   it's impossible

5.

What is 40% of £60?

A £24   B £20   C £100   D   £10

6.

If $12 - k = 4,$ what number does k stand for?

A 16   B − 8   C 2   D 8

7.

How many sides has a pentagon?

A 6   B 5   C 10   D 15

8.

Which two numbers have a difference of 37?

A 3 and 7   B 14 and 23   C 24 and 13   D 13 and 50

9.

If I multiply a whole number by itself, which of these digits can the answer *not* end in?

A 0   B 1   C 2   D 6

10.

How many prime numbers are there between 10 and 30?

A 4   B 6   C 7   D 8

11.

Jo is making a pattern from shapes. She draws a square, a hexagon and an octagon. How many sides should the next shape she draws have?

A 4   B 5   C 7   D 10

12.

How many different isosceles triangles are there which include an angle of $30°$?

A 0   B 1   C 2   D 3

13.

What is the special name for this shape?

A oblong   B rectangle   C trapezium   D parallelogram

14.

Here is a hexagon. If two hexagons are joined together so they share a common side, how many sides has the new shape?

A 2   B 11   C 12   D 10

15.

How many lines of symmetry does a parallelogram have?

A 0   B 1   C 2   D 4

16.

These four numbers have a mean (average) of 4. Which two numbers could replace the blank squares?

2   4   ☐   ☐

A 4 and 4   B 3 and 5   C 5 and 5   D 6 and 8

17.

A bag contains 4 red and 8 yellow cubes. If you pick out a cube at random, what is the chance that it will be red?

A $\dfrac{1}{4}$ B $\dfrac{1}{2}$ C $\dfrac{1}{3}$ D $\dfrac{4}{8}$

18.

Alice's magnifying glass makes things look twice as big. If she uses three of these together, how much bigger will things look?

A 3 ×   B 4 ×   C 6 ×   D 8 ×

19.

Which of these calculations is the odd one out?

A 9 × 4   B 7 × 5   C ½ of 72   D 6^2

20.

If you toss a fair coin twice, which of the following are you more likely to get?

A No 'Heads'   B One 'Heads' C Two 'Heads' D all equally likely

21.

The answer to the calculation $2 \times 3 + 2 \times 4$ is 14 since multiplication must be done before addition. Using brackets can change the answer, as the calculation inside the brackets must be done first. Which of the following answers is it **not** possible to get by using one pair of brackets?

A 22   B 32   C 40   D 48

22.

A   B   C   D   E
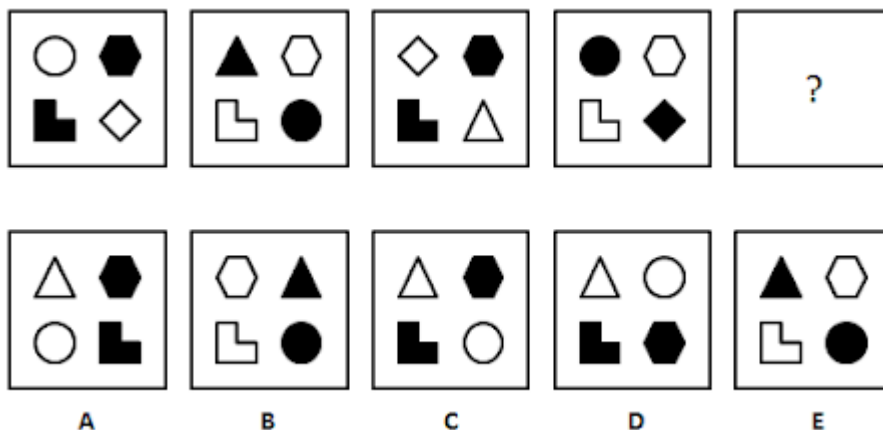
23.

A 'net' for a cube is something that can be cut out and folded to make the cube.

Which of the following is **not** a net for a cube?

A

B

C

D
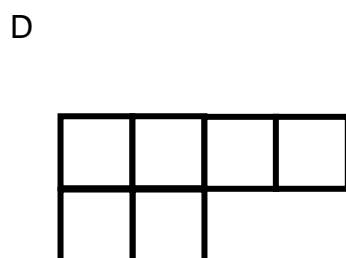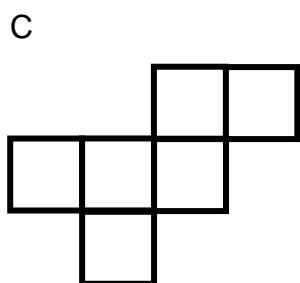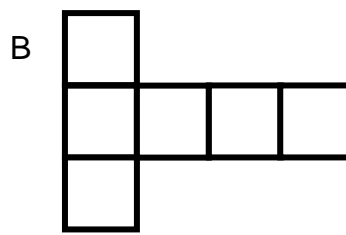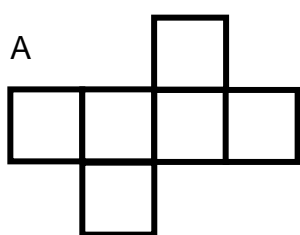
24.

How many triangles are there in this shape?
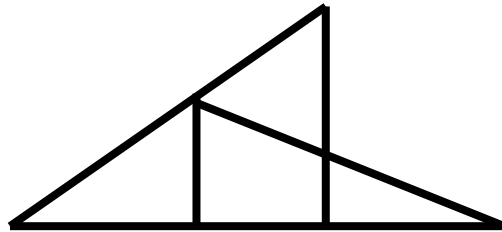
A 3   B 4   C 5   D 6

25.

The 10th of November 2001 can be written in the UK as 10.11.01

This is called a *palindromic* date because it reads the same backwards as forwards.

In which year would the *next* palindromic date occur?

A 2001   B 2002   C 2010   D 2020

Section B

Answer in the spaces provided.

1. Work out   278 + 313

2. Work out   23 × 35

3. Work out   313 – 278

4. Work out   438 ÷ 6

5. Find ¾ of £280

6. Find the smallest number that is a multiple of both 9 and 12.

7. What is the smallest whole number that will **not** divide into 360 without leaving a remainder?

8. What fraction is the same as 30%? Give your answer as a fraction in its lowest terms.

9. Temperatures in a town in Alaska range between –15°C and 20°C

a) What is the difference between the highest and the lowest temperature?

One Monday, the temperature is –4°C.

On Tuesday, the temperature rises by 10°C.

On Wednesday, the temperature falls by 4°C.

b) What is the temperature on Wednesday?

10. Sarya leaves home at 7:48 am to walk to school. The walk takes her 25 minutes. At what time does she arrive at school?

11. Fill in the next numbers in each of these three number patterns:

3   7   11   15   19   ☐

1   3   9   27   81   ☐

1   5   2   6   3   ☐

12. Mr C buys a sandwich for £3.40 and a coffee for £2.80

a) How much does he spend?

b) If he pays with a £10 note, how much change will he receive?

13. In morse code, the symbols ● and ▬ are used. They are sometimes used in groups of three symbols.

Here are two of the groups of three symbols:

● ▬ ▬

● ▬ ●

Altogether, how many different groups of three symbols are possible? (You may draw them if it helps)

14. Mrs M drives for 2 hours at an average speed of 60 miles per hour, then one and a half hours at an average speed of 40 miles per hour.

How many miles has she driven?

15. What is the number of the parking spot where the car is parked?

| 16 | 06 | 68 | 88 | | 98 |
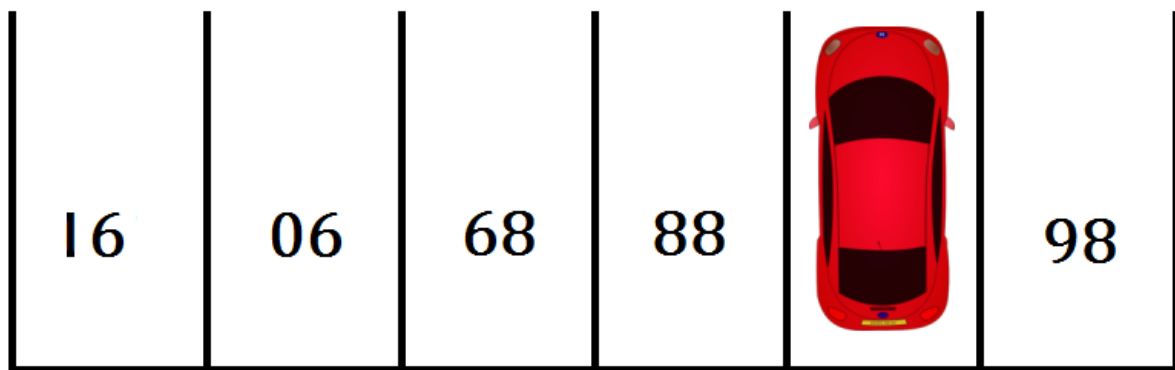
16. Here is a map showing routes and distances in km from A to B:
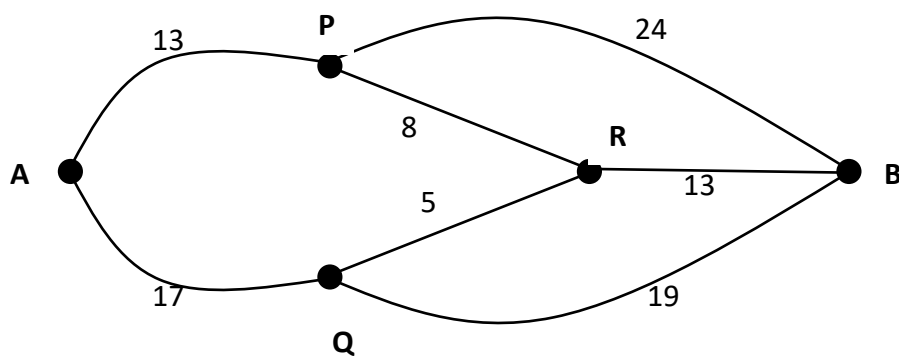
a)   Which is the shorter route, and why: A-P-B   or   A-Q-B?

b)   What is the shortest route from A to B? State the route *and* its distance.

17. What are the coordinates of the point halfway between D and E on the grid?

(…… , ……)
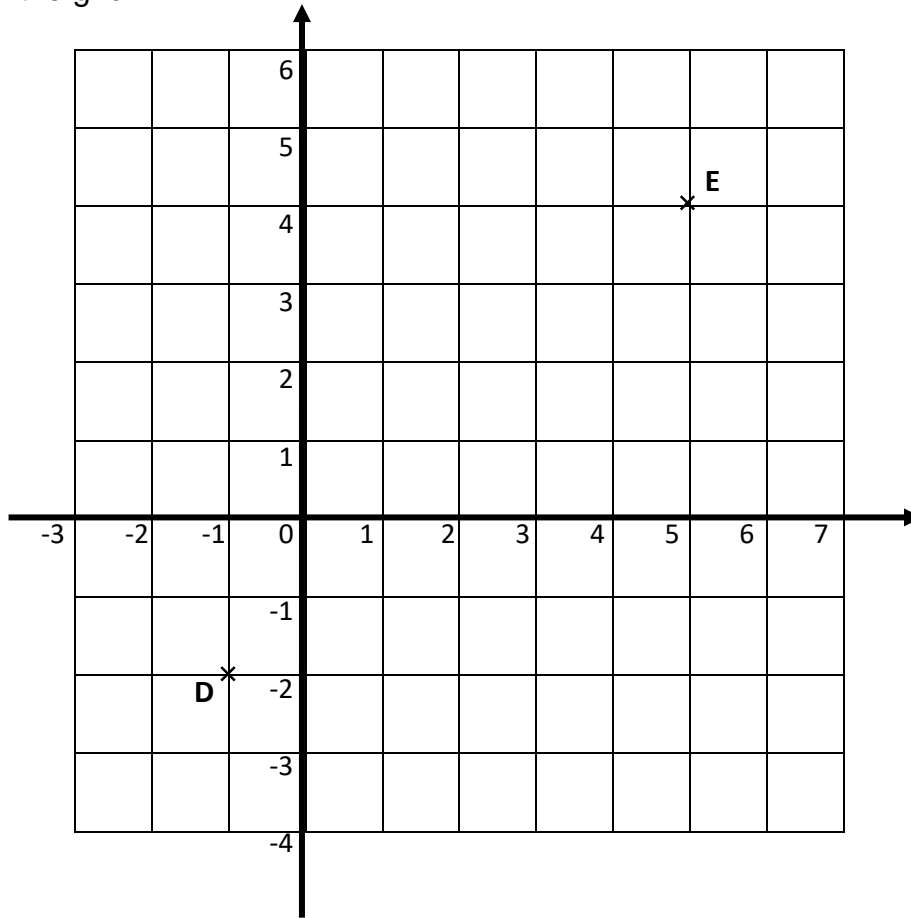
18. Write *2a + 5b + 3a – 2b* in the simplest way possible.

19. Here is an octahedron.

Write down the number of:

a) Faces   ……………

b) Edges   ……………

c) Vertices   ……………
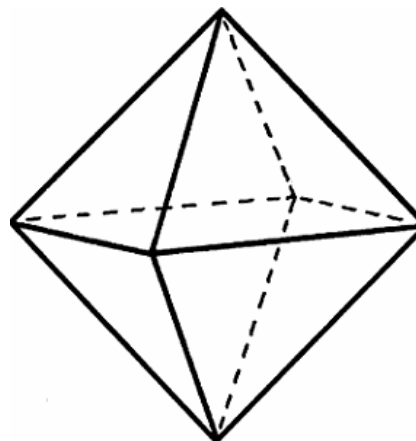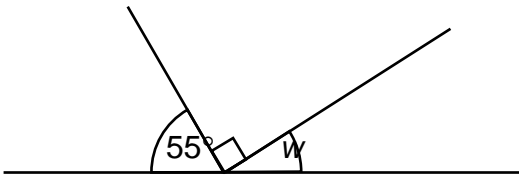
20. Work out the values of each of the symbols:
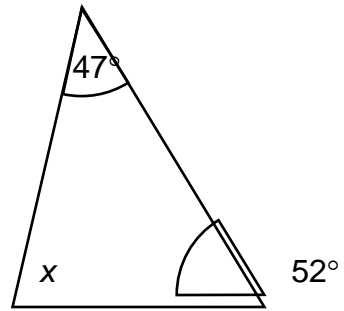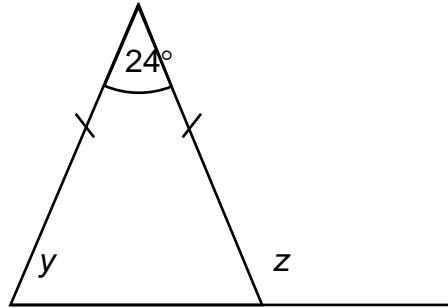

♣ =   ○ =   △ =

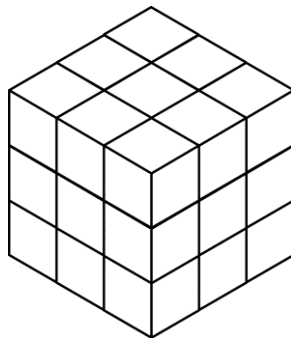**21.** Calculate the missing angles *w, x, y* and *z*.

angle *w* = _____

angle *x* = _____

angle *y* = _____

angle *z* = _____

22. A cube measuring 3cm × 3cm × 3cm is made up of 27 small cubes.
The outside of the cube is to be completely painted.

How many of the small cubes will have:

3 faces painted? _____

2 faces painted? _____

1 face painted? _____

0 faces painted? _____

23. One inch is approximately 2.5 cm.

a) How many cm is 6 inches?

b) How many inches is 60 cm?

24. A game called 'Play Your Hearts Right' uses the 13 Hearts from a deck of cards. In order, from lowest to highest, these are:

Ace, two, three, four, five, six, seven, eight, nine, ten, Jack, Queen, King

The dealer turns over one card at a time, and the player has to guess whether the next card will be 'higher' or 'lower' than the last card.
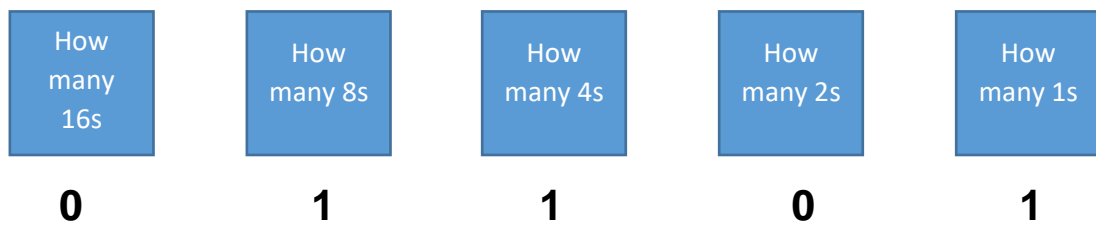
So far, these four cards have been turned over:
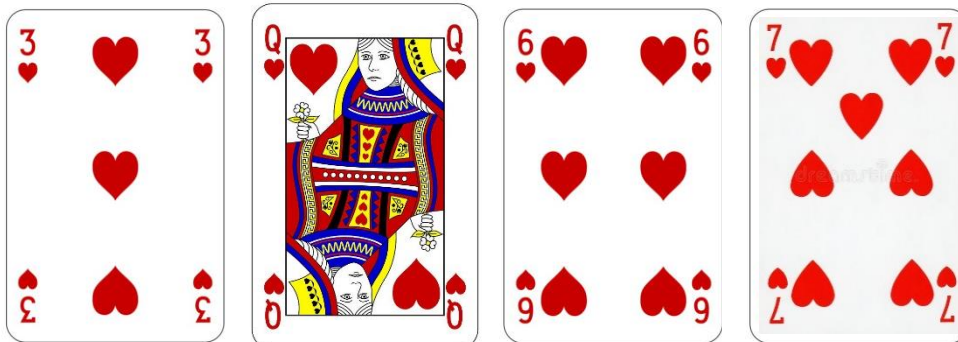
Should the player guess "Higher" or "Lower" for the next card?

You must give a clear explanation of how you decided.

25. The BINARY counting system uses only the digits **0** and **1**. Here is how it works:

How many 16s	How many 8s	How many 4s	How many 2s	How many 1s
0	**1**	**1**	**0**	**1**

would equal **13**, since:

$$0 \times 16 \quad + \quad 1 \times 8 \quad + \quad 1 \times 4 \quad + \quad 0 \times 2 \quad + \quad 1 \times 1$$
$$= \quad 0 \quad + \quad 8 \quad + \quad 4 \quad + \quad 0 \quad + \quad 1$$
$$= \quad 13$$

a) What number would the binary digits **1 0 1 1 0** represent?

b) How would you write the number 29 in binary digits?