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# 13+ ENTRANCE EXAMINATION MATHEMATICS

13+ MATHEMATICS SAMPLE PAPER

Time allowed: 60 minutes

**Instructions**

- Use **black** ink or ball-point pen.
- Answer **all** questions in the spaces provided – *there may be more space than you need.*

**Information**

- The total mark for this paper is 100.
- Calculators are **not** allowed.
- The marks for **each** question are shown in brackets: *use this as a guide as to how much time to spend on each question.*

**Advice**

- Write your answers on the dotted lines provided.
- Show your working so it is clear how you obtained your answers.
- Work steadily through the test doing as much as you can straight away. Then go back and try the more difficult questions. Try to answer every question.
- Check your answers if you have time at the end.

**Candidate Name** _____

**Candidate Current School** _____

1. Evaluate $92 \times 857$

..... (2)

2. Evaluate nine thousand, three hundred and sixteen divided by sixty eight.

..... (2)

3. Work out and simplify:

a) $\frac{3}{8} + \frac{1}{6}$

..... (2)

b) $4\frac{2}{7} - \frac{4}{5}$

..... (2)

c) $7 \times \frac{4}{9}$

..... (2)

d) $3\frac{1}{8} \times 1\frac{1}{15}$

..... (2)

e) $\frac{13}{27} \div \frac{26}{45}$

..... (2)

4. Complete the table so that the values in each row represent the same value

| | Fraction* | Decimal | Percentage | |
|---|---|---|---|---|
| Example: | $\frac{1}{2}$ | 0.5 | 50% | |
| | $\frac{3}{4}$ | | | (2) |
| | | 0.8 | | (2) |
| | $\frac{13}{20}$ | | | (2) |
| | | 0.72 | 72% | (2) |

*Fractions in simplest form.

5. The first four terms of a sequence are:

4 7 10 13

a) Write down a rule that defines the sequence.

..... (1)

b) Evaluate the 20th term of the sequence.

..... (1)

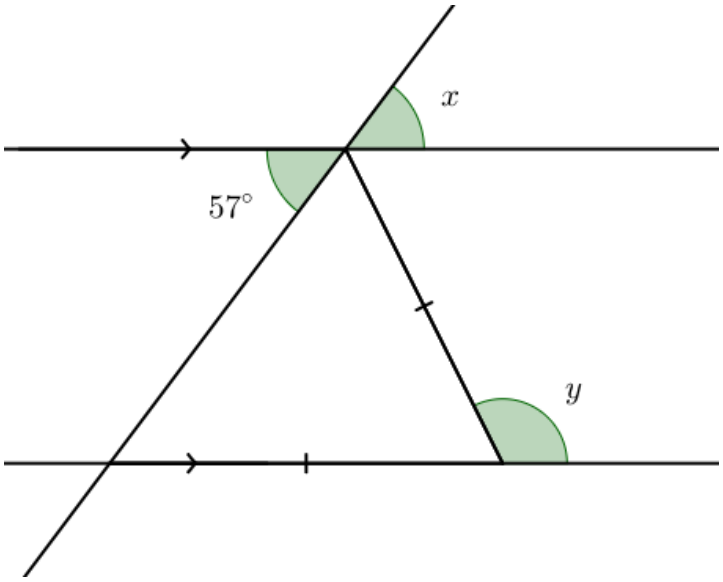
c) 91 is a term in the sequence, determine its position.

..... (1)

6. £156 is to be shared in the ratio 4:9.
Determine the difference, in £, between the two amounts.

..... (2)

7. Find the size of angles *x* and *y* in the diagram below.




You are required to show all your working and provide a supporting reason for each stage of working.

(Where appropriate, you may mark additional angles on the diagram with letters)

a) Find angle *x*

*x* = ..... (2)

b) Find angle *y*

*y* = ..... (3)

8. The circumference of a circle is given by the formula $C=2\pi r$
The area of a circle is given by the formula $A=\pi r^2$

a) Using $\pi = \frac{22}{7}$, find the circumference of a circle of radius 35m.

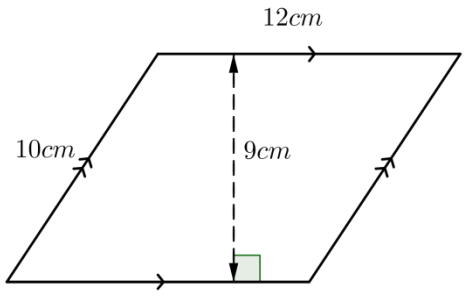
*Circumference* = ..... (2)

b) The area of a circle is found to be $36\pi$ cm$^2$. Find its diameter.

*Diameter* = ..... (2)

9. Find the area and the perimeter of each of the shapes below:

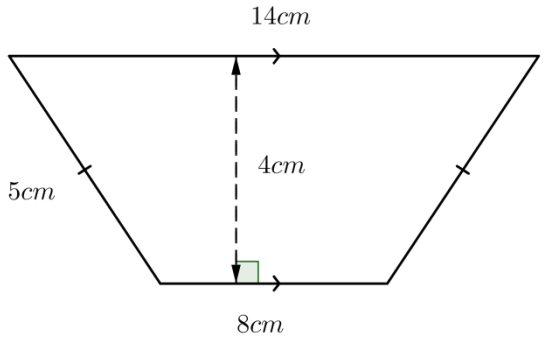
a)




Area: ..... ... (2)

Perimeter: ..... ... (1)

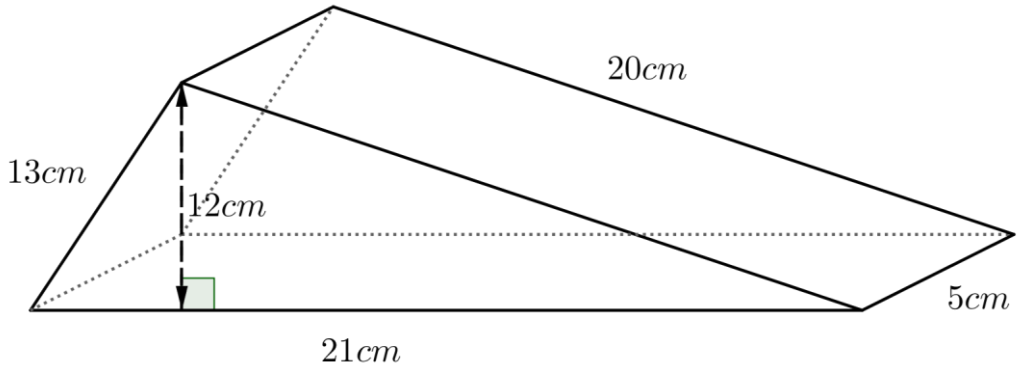
b)




Area: ..... ... (2)

Perimeter: ..... ... (1)

10. A design of door wedge is shown below:




Find:

a) The volume of the wedge. State the units of your answer.

Volume: ..... ... (4)

b) The surface area of the wedge. State the units of your answer.

Surface Area: ..... ... (3)

11.

a) Write 294 as a product of its prime factors.

..... (1)

b) Find the highest common factor of 45 and 72.

.....

(2)

c) Find the lowest common multiple of 45 and 72.

.....

(2)

12. A crew of 4 rowers have a mean weight of 95kg. During a race one of the rowers, weighing 101kg falls out of the boat. Calculate the mean weight of the rowers remaining in the boat.

.....

(3)

13. Simplify the following expressions:

a) $3x + 5y - 7x + 16$

.....

(2)

b) $4(3x - 5) - 7(2x - 3)$

.....

(2)

c) $4a^2b + 3b^2a - 11ba^2 + 17ab^2 - a^2b^2$

| | |
|---|---|
| ..... | (2) |
| 14. Three parcels have mass $(4p-2)kg, (p+1)kg,$ and $(2p+3)kg$<br><br>Find an expression, in terms of $p$, for the sum of their masses. Simplify your answer.<br><br>..... | (2) |
| 15. Find the value of the following expressions given $a=3, b=-2, c=6$<br><br>a) $a+b-c$<br><br>.....<br><br>b) $\frac{ab^2}{c}$<br><br>.....<br><br>c) $(a-b)(b-c)$<br><br>..... | (2)<br><br>(2)<br><br>(2) |
| 16. Solve the following equations:<br><br>a) $3x+7=40$ | |

$x$ = .....

(2)

b) $6x - 3 = 2x + 9$

$x$ = .....

(2)

c) $6x - 4(6x - 2) = 5(7 - 3x)$

$x$ = .....

(2)

17. For the following triangle, form an equation in terms of $x$ and solve to find its value.

$x$ = .....

(2)

18. In a Year 9 class, 56% of the pupils are girls.

What is the smallest number of pupils there could be in the class?

.....

(2)

19. In a bag, there are 5 red discs, 3 blue discs, 2 green discs, 1 yellow disc and 1 white disc.

A disc is picked at random, what is the probability the disc is:

a) White

..... (1)

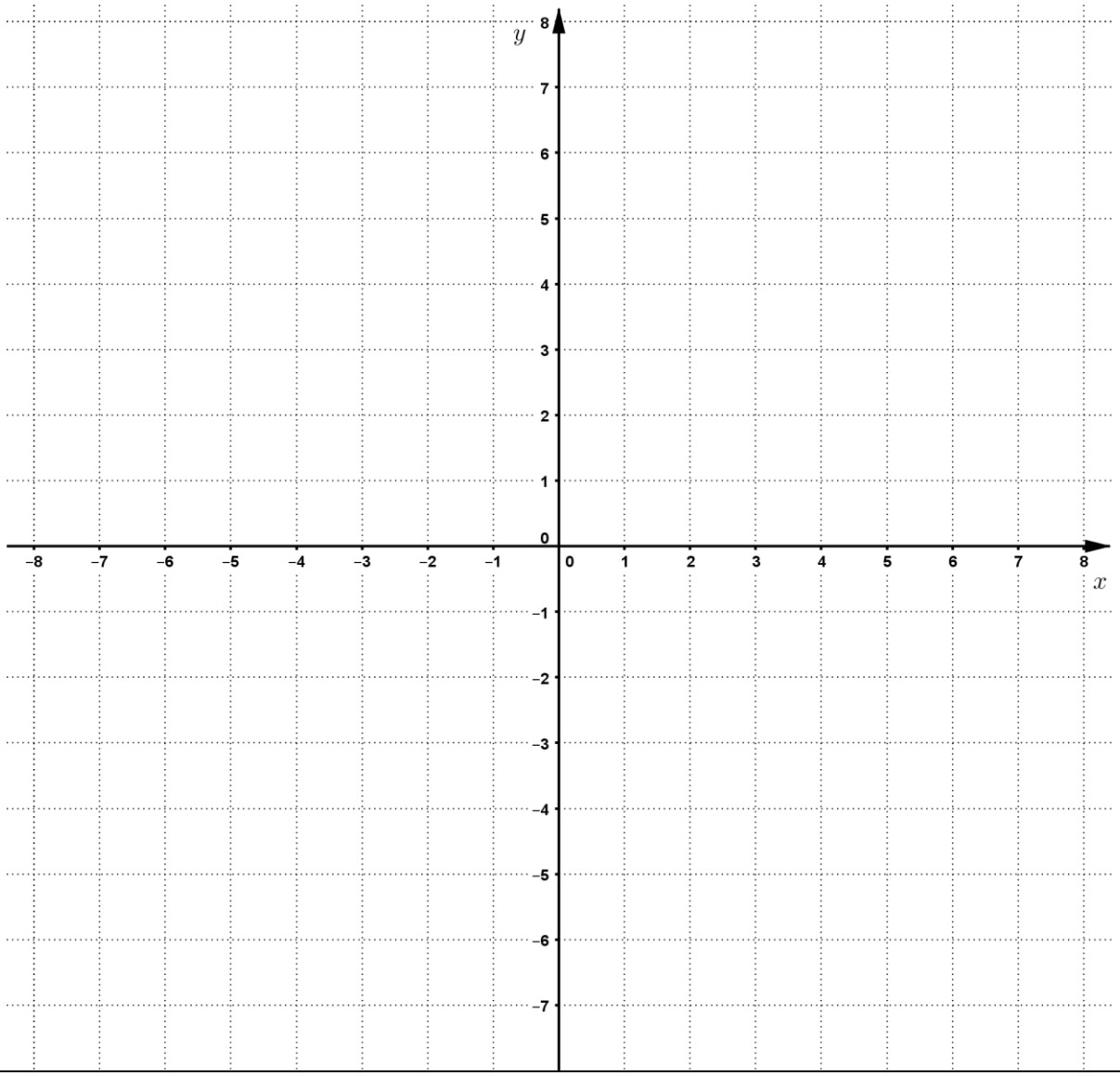
b) Red or yellow

..... (1)

c) Not blue

..... (1)

20.



On the grid above:

a) Draw and label shape A which has vertices with coordinates (2,4), (6,4) , (6,6) and (1,6). (1)

b) What is the name of shape A

..... (1)

c) Reflect shape A in the x axis to form shape B. Label shape B. (1)

d) Reflect shape B in the line $y = x$ to form shape C. Label shape C. (1)

e) Reflect shape C in the x axis to form shape D. Label shape D. (1)

f) Draw the mirror line for the reflection of shape A onto shape D. (1)

g) State the equation of the mirror line drawn in f).

..... (1)

21. Two numbers are picked from the list below:

| | |
|---|---|
| A | 956.49 |
| B | 957.38 |
| C | 957.52 |
| D | 956.84 |
| E | 956.92 |

The two numbers are the same when rounded to three significant figures but different when rounded to one decimal place. Identify the two possible combinations.

Letters of pair 1:..... ... (1)

Letters of pair 2:..... ... (1)

22. The table below shows the number of different types of tree found in a local woodland.

| Tree Type | Frequency |
|---|---|
| Oak | 582 |
| Ash | 150 |
| Silver Birch | |
| Hawthorn | 250 |
| Elm | 355 |
| Total | 1800 |

a) Determine how many Silver Birch trees are in the woodland.

(2)

.....

b) A pie chart is drawn to show the proportion of the different types of tree in the woodland. What angle should be used for the pie sector representing Ash trees?

(2)

.....

c) A separate woodland has a very similar proportion of the different tree types but with 7200 trees in total. Approximately how many Hawthorn trees does the new woodland have?

(2)

.....

## END OF TEST

Now go back to the beginning and check your work.

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