| *DO NOT WRITE ON THIS PAPER* | **TIME** 2 hours | *Paper 2 of 5 from ZigZag Education* |
|---|---|---|
| **Sample GCSE Examination Paper**<br>**Intermediate Tier Calculator Paper** | Standard Equipment: lined or squared paper, pen, pencil, ruler, CALCULATOR.<br>Additional Equipment: pair of compasses, plain paper.<br>Notes: graph paper or squared paper useful for Q2 Q9 & Q16. | |

1. Solve the equations–

   a) $6 - 2x = 2x - 6$

   b) $2(1 + x) = x - 2$

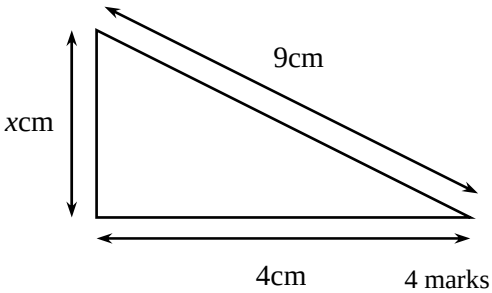
   Calculate the value of y when $x = 3$ in the equations–

   c) $y = x(x + 1)$

   d) $y = 10^x$ 8 marks

2. Draw the graph of $y - x = 7$ 5 marks

3. Work out a formula for the perimeter and area of the triangle.




4 marks

4. Work out–

   (a) $169^2$

   (b) $2^{24}$ 2 marks

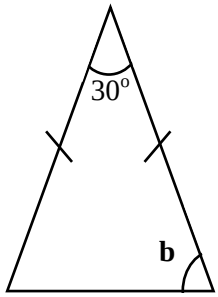
5. (a) Estimate the value of $(39 \times 98) \div 19$ without a calculator, and showing your working.

   (b) Calculate the exact value of $(39 \times 98) \div 19$ giving your answer as a mixed fraction.

   (c) Work out the difference between your estimate and the exact value of $(39 \times 98) \div 19$. 4 marks

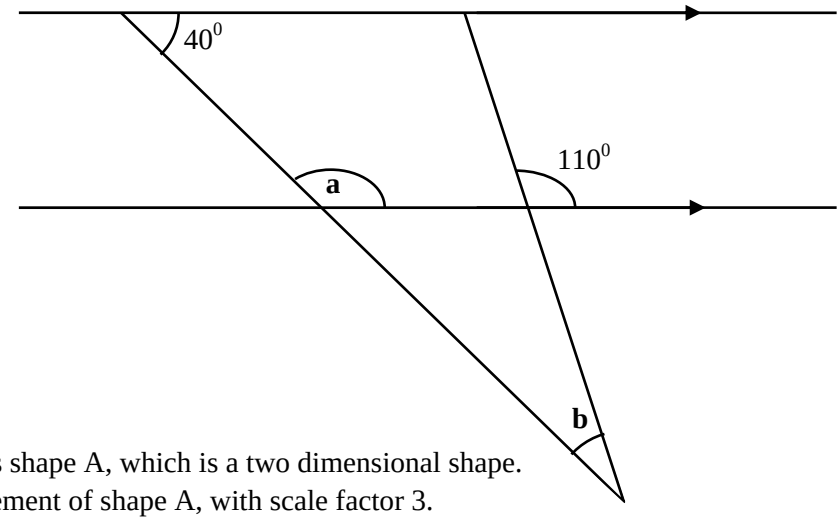
6. A phone costs £12 plus vat at 17.5%.
   Calculate the cost of the phone after VAT has been added. 3 marks

7. Here is an isosceles triangle. Work out angle *b*. 2 marks



8. Calculate the two missing angles **a** and **b**.

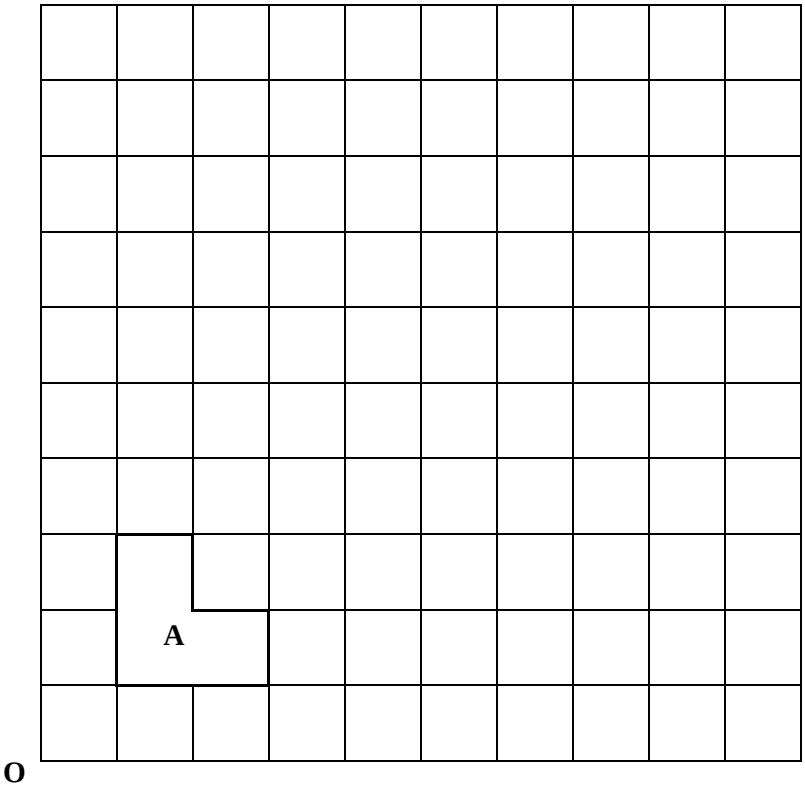
Not drawn accurately




4 marks

9. The diagram contains shape A, which is a two dimensional shape.
Shape B is an enlargement of shape A, with scale factor 3.
The centre of enlargement is at the bottom left corner of the diagram, marked O.

(a) Copy the diagram and draw shape B onto the diagram.




(b) Draw on the diagram a line of symmetry which is common to shapes A and B. 7 marks

(c) Write down the perimeters of the two shapes A and B. Link these answers to the enlargement.

10. There are four balls on a pool table. Two of these balls have a coloured spot on them, and the other two have a coloured stripe on them. Each ball is also marked with a single number. The spotted balls are marked with the numbers 1 and 2, and the striped balls are marked with the numbers 3 and 4.
All the balls are put into a bag, and Jane selects one ball from the bag at random.

(a) What is the probability that the selected ball is numbered 3?

(b) What is the probability that the selected ball is spotted, or even numbered, or both?

(c) What is the probability that the selected ball is odd numbered and striped?

Jane then selects a 2nd ball at random, so she now has two pool balls. The possible pattern combinations are represented in the following table. There are 4 possible combinations.

| First Ball Selected | Second Ball Selected |
|---|---|
| stripe | spot |
| stripe | stripe |
| spot | spot |
| spot | stripe |

Jane begins to similarly list the possible combinations of numbers. She begins:

| First Ball Selected | Second Ball Selected |
|---|---|
| 1 | 2 |
| 1 | 3 |

d) Explain why the table does not have the combination 1, 1.

e) Copy and complete the table of possible number combinations.

f) How many possible combinations of numbers are there? 6 marks

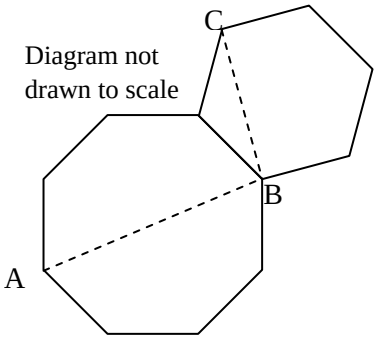
11. a) Multiply out and simplify the expression $(x - 3)(x + 4)$.

b) Factorise the expressions:

i) $x^2 + 3x$

ii) $x^2 - 10x - 11$ 6 marks

12. The diagram shows two regular polygons of side 3cm. Calculate lengths AB and length BC, giving your answers to 2 decimal places. 10 marks

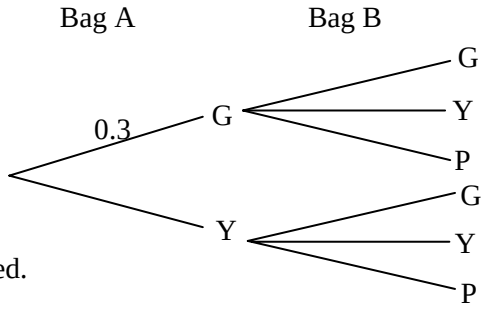



13. a) Write 48 as the product of primes.

b) Write $48^3$ as the product of primes. 4 marks

14. Bag A contains 3 green balls and 7 yellow balls
Bag B contains 7 green balls and 2 yellow balls and a pink ball.

a) Copy and complete the tree diagram with probabilities




b) Calculate the probability that no yellow balls are selected. 4 marks

15. The speed of light in vacuum is exactly 299,792,458 m/s.

a) i) Write 299,792,458 in standard index form to 4 significant figures.

ii) Write 299,792,458 in standard index form to 3 significant figures.

The metre is defined as the length of the path travelled by light in vacuum during a time interval of $\frac{1}{299\,792\,458}$ of a second.

b) Write 1 ÷ 299 792 458 in standard index form to 3 significant figures.

The speed of sound in dry air is given approximately by v, where

$v = 331.4 + 0.6T$ m/s (where T is the Celsius temperature.)

c) Calculate the speed of sound at 54°C, where C stands for Celsius.

d) Taking the speed of sound to be 331.4m/s, calculate the ratio of the speed of light to the speed of sound in the form n:1, with n given to 2 significant figures. 7 marks

16. The heights of 100 people in an army regiment are summarised in the following table:

| Height in metres | Frequency |
|---|---|
| $1.4 < h \leq 1.5$ | 15 |
| $1.5 < h \leq 1.6$ | 25 |
| $1.6 < h \leq 1.7$ | 34 |
| $1.7 < h \leq 1.8$ | 26 |

The smallest height was 1.44m. The largest height was 1.78m tall. The median height was1.62m.
The first quartile height was 1.53m. The third quartile height was 1.72m.
Using a suitable scale, draw a box and whiskers plot of the heights of the people in the squad. 3 marks

17. The scale used in this diagram is 1cm represents 5km.
Reproduce the sketch map showing points A and B roughly 5cm apart, and make sure that the line AB is not horizontal or vertical.
Points A and B represent mines in a mine field in the ocean.
A boat navigates its way through the middle of the two mines such that it is always equidistant from each mine.


Use a ruler and compasses only to show the path of the boat.
Clearly mark on the diagram the path of the boat. 5 marks


18. The hire charge for a jeep £54 per day plus £2 per mile.
Ahmid wishes to hire the jeep for 3days. He spends £$x$ with $x > £162$ and he travels **y** miles.
a) Write down an expression for the cost of Ahmid's trip in terms of **y**.
b) Find an expression for the distance travelled **y** in terms of $x$. 5 marks

19. In the following, Diagram 1 uses 4 tiles.


Diagram 1

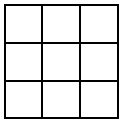


Diagram 2

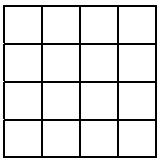


Diagram 3

a) Formulate an expression in terms of n, for the number of tiles in the $n^{th}$ diagram.

The outside square of tiles are shaded, as shown for diagram 3:
Diagram 3 has 12 shaded tiles and 4 white tiles.

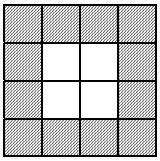


Diagram 3

b) Formulate an expression in terms of n, for the number of shaded tiles in the $n^{th}$ diagram, with $n > 1$.

c) Formulate an expression in terms of n, for the number of white tiles in the $n^{th}$ diagram, with $n > 1$.
6 marks

20. The width of a rectangular swimming pool is $x$ metres.
The length of the pool is 5m **less** than its width.
The total area of the pool is $50m^2$.

a) Show that $x^2 - 5x - 50 = 0$
b) Solve the equation $x^2 - 5x - 50 = 0$ and interpret your solutions. 5 marks