



13 + Entrance Examination

Maths Level 3 Non-Calculator Paper 3

You have 90 minutes to complete this paper. Calculators are **not** allowed.

Do as many questions as you can and keep an eye on the time.

Show your working in the spaces provided and write your answers on the dotted lines. If you do not show enough working you may not get any marks.

Be sure to include units in your answers where appropriate.

The marks for each part are in square brackets. The total number of marks for the paper is 130.

This paper is equivalent to ISEB Level 3.

Full name

1. Work these out using any method you know :

a) One and a half of 4356

.....(2 marks)

b) 32.7×0.3

.....(2 marks)

c) $202.5 \div 0.45$

.....(2 marks)

d) 0.02^2

.....(2 marks)

e) $1\frac{2}{3} + 4\frac{5}{6}$

.....(2 marks)

f) $15 \times 1\frac{2}{5}$

.....(2 marks)

g) $7\frac{1}{12} \div \frac{17}{24}$

.....(2 marks)

h) $2^5 \times 9^2$

.....(2 marks)

i) $1^1 + 7^2 + 5^3$

.....(2 marks)

2. Multiply out and simplify :

a) $3(2x + 11)$

.....(2 marks)

b) $x(x + 2y) - y(2x - y)$

.....(3 marks)

c) $(3x + 1)(2x - 7)$

.....(3 marks)

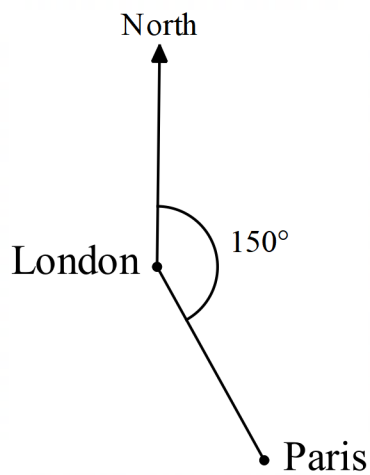
d) $(2x - y)^2$

.....(3 marks)

e) $x^2 - (x + 1)(x - 1)$

.....(3 marks)

3. The bearing of Paris from London is 150° .
What is the bearing of London from Paris?



.....(2 marks)

4. Solve the inequality $x^2 \leq 100$

.....(2 marks)

5. Find the length of the line segment joining the points $(-3, -2)$ and $(2, 10)$.

.....(3 marks)

6. You are given that $y = 50 - 2x^2$

a) Find the value of y when $x = 2$.

.....(2 marks)

b) Find the two values of x when $y = 0$.

.....(2 marks)

7. Work out $(6.5 \times 10^4) - (6 \times 10^4)$.

.....(2 marks)

8. I have less than 100 packets of sweets.

I can pack them into either boxes of 12 or boxes of 16 and have none left over, but if I pack them in boxes of 5 then I have one left over.

How many packets of sweets do I have?

.....(3 marks)

9. Here is a number pattern : 96, 92, 88, 84,

a) Work out the 10th number in this pattern.

.....(2 marks)

b) Work out the 50th number in this pattern.

.....(3 marks)

10.

- a) **Is increasing 20 by 25% the same as increasing 25 by 20%?**

Show your working.

.....(2 marks)

- b) **Is 20% of 25 the same as 25% of 20?**

Show your working.

.....(2 marks)

- c) **I bought a book for £15 and sold it for £21.**

How much percentage profit did I make?

.....(2 marks)

11.

a) **Work out the value of x :**

$$\frac{3}{5} - \frac{x}{3} = \frac{4}{15}$$

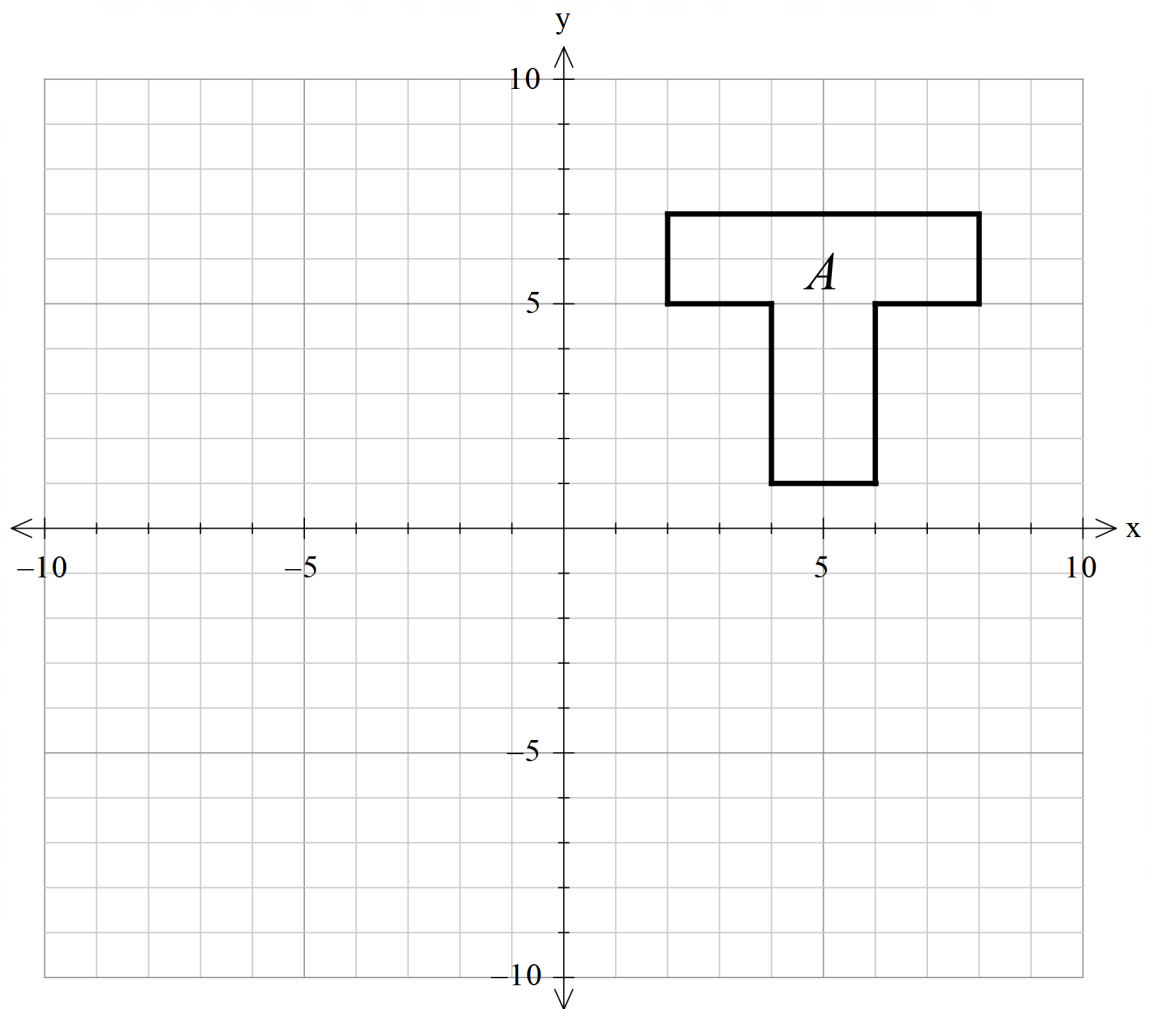
.....(3 marks)

b) **Work out the value of y :**

$$\frac{4}{7} \div \frac{y}{5} = \frac{10}{7}$$

.....(3 marks)

12. The diagram below shows a shape labelled A on a set of axes.



Draw your answers to the following on the diagram above. Use a ruler.

- a) Reflect the shape *A* in the *x*-axis and label it *B*. (2 marks)
- b) Rotate the shape *A* through 90° anti-clockwise about the point $(0,0)$ and label it *C*. (2 marks)
- c) Translate the shape *A* through the vector $\begin{pmatrix} -11 \\ -9 \end{pmatrix}$ and label it *D*. (2 marks)

13. The diagram shows three right-angles triangles joined together.

Work out the area of the triangle ABC.

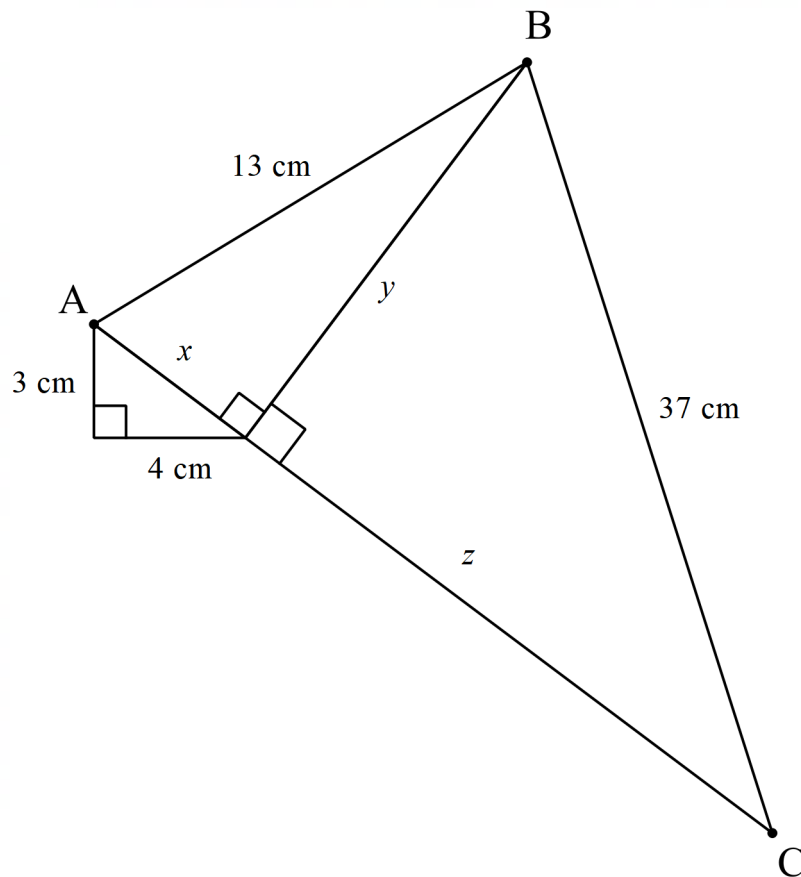
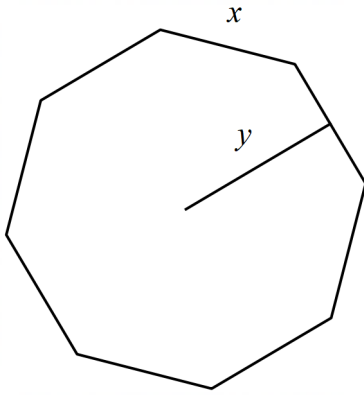


Diagram NOT drawn
to scale

.....(4 marks)

14. Work out the area of the regular octagon shown below. Leave x and y in your answer.



.....(3 marks)

15. You are given the following information :

4 gills	=	1 pint
2 pints	=	1 quart
4 quarts	=	1 gallon
2 gallons	=	1 peck
4 pecks	=	1 bushel
8 bushels	=	1 quarter

a) How many gills are there in 2 quarters?

.....(2 marks)

b) What fraction of a peck is a pint?

.....(2 marks)

16. Three boys ran a race. Alfie took $1\frac{2}{3}$ hours, Bert took 95 minutes and Charlie took 1.6 hours. What was their mean time, in hours and minutes?

.....(3 marks)

17. A box of cereal and a litre of milk cost £3.10. The cereal costs £1.20 more than the milk. How much does the milk cost?

.....(3 marks)

18. To convert between degrees Celsius (C) and Fahrenheit (F) we can use the formula $9C = 5F - 160$.

a) Convert 86 degrees Fahrenheit to degrees Celsius.

.....(2 marks)

b) Convert 5 degrees Celsius to degrees Fahrenheit.

.....(2 marks)

c) At what temperature is the degrees in Celsius equal to the degrees in Fahrenheit?

.....(3 marks)

19. Solve the equations :

a) $4(x + 3) = 20$

.....(2 marks)

b) $7x - (x - 1) = -5$

.....(2 marks)

c) $\frac{7x}{2} - \frac{x-1}{8} = -1$

.....(4 marks)

20. Simon is 12 years old and Paul is 49 years old.

In how many years will Paul be twice as old as Simon?

.....(4 marks)

21. The mean amount of money Abdul, Brady, Ciara, Dom and Erika have is £21.

The mean amount of money Abdul and Brady have is £30.

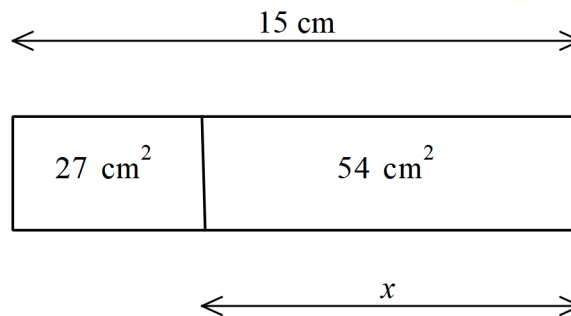
What is the mean amount of money which Ciara, Dom and Erika have?

.....(4 marks)

22. Dad is three times as old as Brian who is two years younger than Christine who is half Mum's age. The total of their four ages is 104.
How old is the dad?

.....(4 marks)

23. The diagram below shows two rectangles, joined together to make a larger rectangle. The total length of the rectangles is 15 cm. The area of each rectangle is as shown. Find the length x .



.....(3 marks)

24. In a bag, there are 3 blue pens, 5 red pens and 12 green pens.

a) I choose one pen at random from the bag. What's the probability that it is green?

.....(2 marks)

b) I add some more green pens to the same bag so that the probability of choosing one green pen is now $\frac{3}{4}$. How many green pens did I add?

.....(3 marks)

25. Look at the following pattern :

$$1^2 + 3^2 = 2(2^2 + 1)$$

$$3^2 + 5^2 = 2(4^2 + 1)$$

$$5^2 + 7^2 = 2(6^2 + 1)$$

a) Write down the next two statements in this pattern.

.....(1 mark)

.....(1 mark)

b) Write down the tenth statement in this pattern.

.....(1 mark)

c) Write down the n th statement in this pattern, and explain why it's true.

n th statement :.....(4 marks)

Reason :

End

Answers

1 (a) 6534

(b) 9.81

(c) 450

(d) 0.0008

(e) $6\frac{1}{2}$

(f) 21

(g) 10

(h) 2592

(i) 175

2 (a) $6x + 33$ (b) $x^2 + y^2$ (c) $6x^2 - 19x - 7$

(d) $4x^2 - 4xy + y^2$ (e) 1

3 330°

4 $-10 \leq x \leq 10$

5 13

6 (a) 42 (b) 5 or -5

7 5×10^3 or 5000

8 96

9 (a) 60 (b) - 100

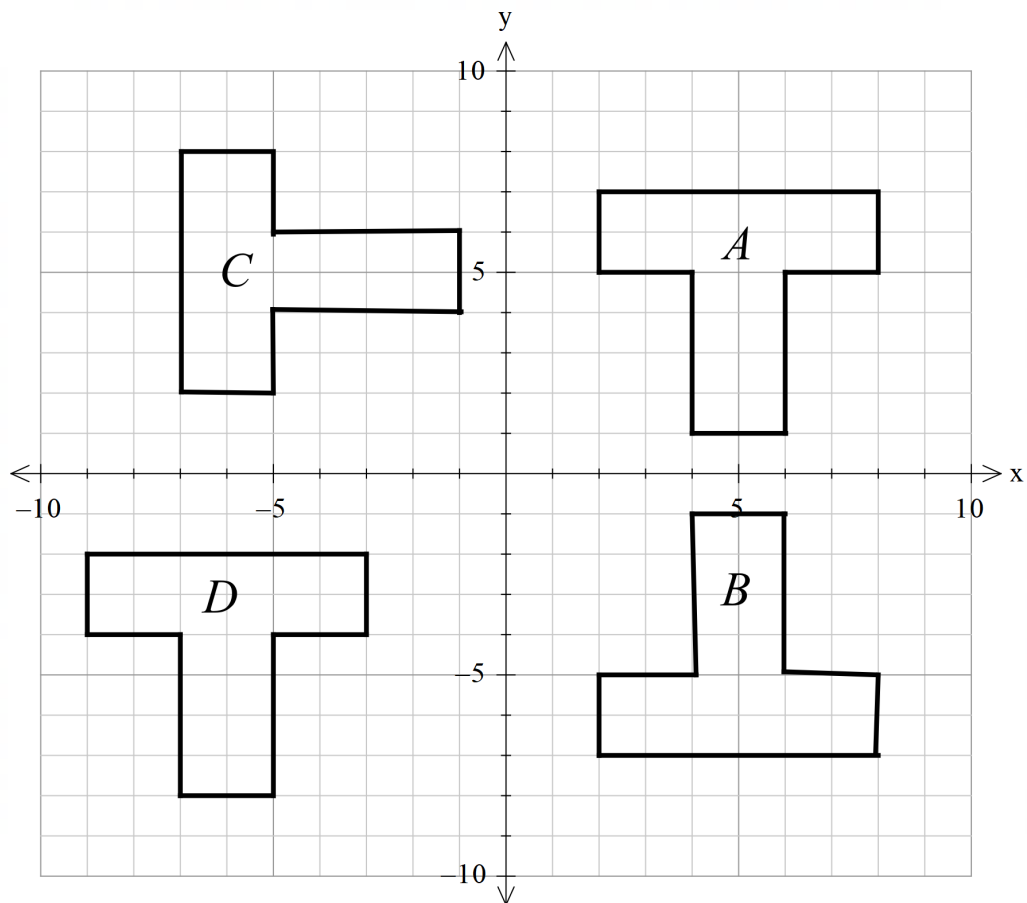
10 (a) No, they are 25 and 30 respectively

(b) Yes, they are both 5

(c) 40%

11 (a) $x = 1$ (b) $y = 2$

12



13 $x = 5$ $y = 12$ $z = 35$ Area = $\frac{1}{2} \times 40 \times 12 = 240 \text{ cm}^2$

14 $4xy$

15 (a) 4096 (b) $\frac{1}{16}$

16 1 hour and 37 minutes.

17 95 pence (the cereal costs £2.15)

18 (a) 30 (b) 41 (c) -40

19 (a) $x = 2$ (b) $x = -1$ (c) $x = -3$

20 In 25 years

21 £15

22 42 (Dad is 42, Brian is 14, Christine is 16, Mum is 32)

23 $x = 10$ cm

24 (a) $\frac{3}{5}$ (b) Add 12 more green pens

25

4^{th} statement is: $7^2 + 9^2 = 2(8^2 + 1)$

(a) 5^{th} statement is: $9^2 + 11^2 = 2(10^2 + 1)$

(b) 10^{th} statement is: $19^2 + 21^2 = 2(20^2 + 1)$

(c) $(2n-1)^2 + (2n+1)^2 = 2((2n)^2 + 1)$

$$\begin{aligned}\text{Left hand side} &= 4n^2 - 4n + 1 + 4n^2 + 4n + 1 \\ &= 8n^2 + 2\end{aligned}$$

$$\begin{aligned}\text{Right hand side} &= 2(4n^2 + 1) \\ &= 8n^2 + 2\end{aligned}$$

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