

Teach Me Maths

Please write clearly in block capitals.

Name _____

Date _____

GCSE MATHEMATICS

H

Higher Tier • Paper 1 (Non-Calculator)

Mock Set A

For AQA GCSE Mathematics (8300)

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- mathematical instruments
- the Formulae Sheet (the last page of this paper).

You must **not** use a calculator.

For the marker

TOTAL (out of 80)

Instructions

- Write in black ink or black ball-point pen. Use a pencil for diagrams.
- Write your name and the date at the top of this page.
- Answer **all** questions.
- Write your answers in the spaces provided. If you need more room, use extra paper and write the question number next to your answer.
- Do all your rough work on this paper. Cross out any work you do not want to be marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this paper is 80.
- You may use extra answer paper, graph paper and tracing paper.

Advice

In every calculation, show clearly how you get your answer.

Practice paper written by Teach Me Maths in the style of AQA GCSE Mathematics (8300). Not an official AQA paper.

Answer **all** questions in the spaces provided.

- 1** Each ticket sold for a concert is a standing ticket or a seated ticket.

number of standing tickets : number of seated tickets = 7:4

What fraction of the tickets sold are seated tickets?

Circle your answer.

[1 mark]

$$\frac{4}{7}$$

$$\frac{4}{11}$$

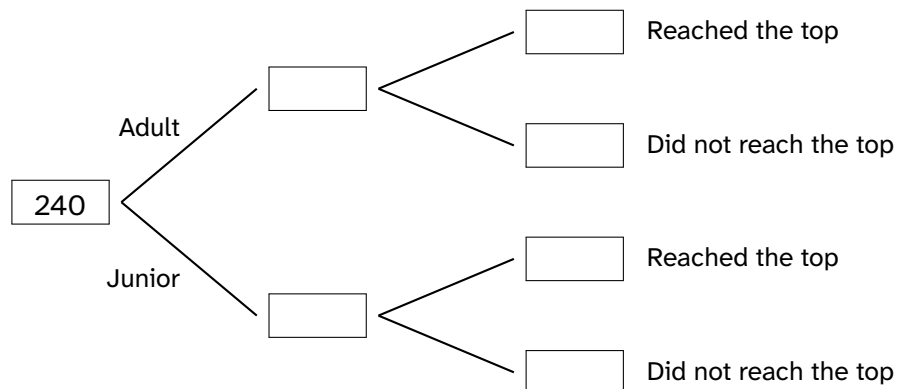
$$\frac{7}{11}$$

$$\frac{7}{4}$$

- 2** 240 people use a climbing centre on one day.

- $\frac{5}{8}$ of the people are adults. The rest are juniors.
- 40% of the adults reach the top of the hardest wall.
- 20% of the juniors reach the top of the hardest wall.

Complete the frequency tree.



[3 marks]

3 Each interior angle of a regular polygon is 160°

(a) Work out the size of each exterior angle of the polygon.

[1 mark]

Answer _____ degrees

(b) Work out the number of sides of the polygon.

[1 mark]

Answer _____

4 Work out $2\frac{2}{3} \div 1\frac{3}{5} + \frac{3}{4}$

Give your answer as a mixed number in its simplest form.

[3 marks]

Answer _____

- 5** (a) Write 0.000 058 in standard form.

[1 mark]

Answer _____

- (b) Work out $(4 \times 10^7) \times (3.5 \times 10^{-2})$

Give your answer in standard form.

[2 marks]

Answer _____

- 6** A mosaic for a community centre is made from blue tiles, white tiles and red tiles only.

- number of blue tiles : number of white tiles = 3:5
- number of white tiles : number of red tiles = 2:3
- There are 108 more red tiles than blue tiles.

Work out the total number of tiles in the mosaic.

[4 marks]

Answer _____

7 Solve $\frac{3x+2}{4} - \frac{x-5}{3} = 3$

[3 marks]

$x =$ _____

8 Work out the smallest integer value of x that satisfies $4 - 3x < 2x + 23$

[2 marks]

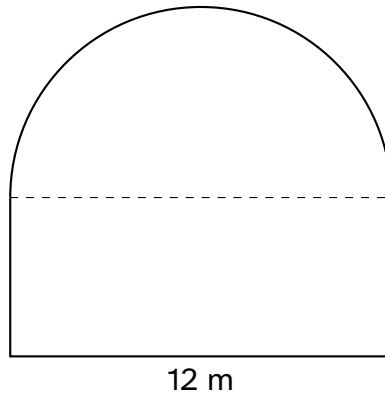
$x =$ _____

- 9 The diagram shows the outline of a garden pond.

It is made from a rectangle and a semicircle.

The rectangle is 12 m long and has area 60 m^2 .

The diameter of the semicircle is one of the long sides of the rectangle.



Not drawn accurately

Work out the perimeter of the pond.

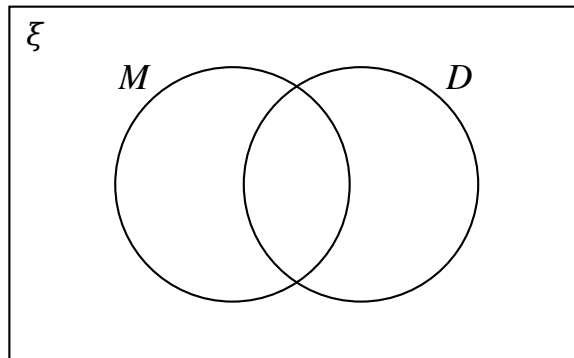
Give your answer in the form $a + b\pi$

[3 marks]

Answer _____ m

- 10 $\xi = \{\text{students in Year 10}\}$
 $M = \{\text{students in the music club}\}$
 $D = \{\text{students in the drama club}\}$

(a) On the Venn diagram, shade the region $M \cap D'$



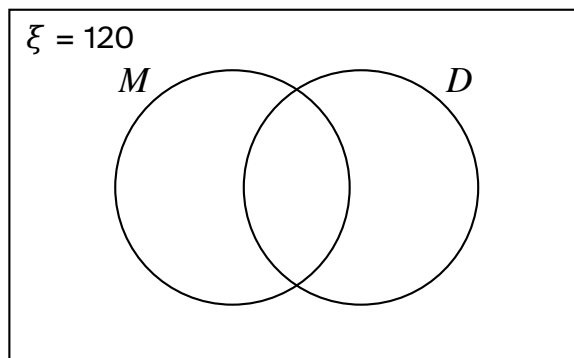
[1 mark]

- (b) There are 120 students in Year 10.
- 50 students are in the music club.
 - 34 students are in neither club.
 - Twice as many students are in the drama club only as are in both clubs.

A student in the drama club is chosen at random.

Work out the probability that this student is also in the music club.

You may use the Venn diagram to help you.



[3 marks]

Answer _____

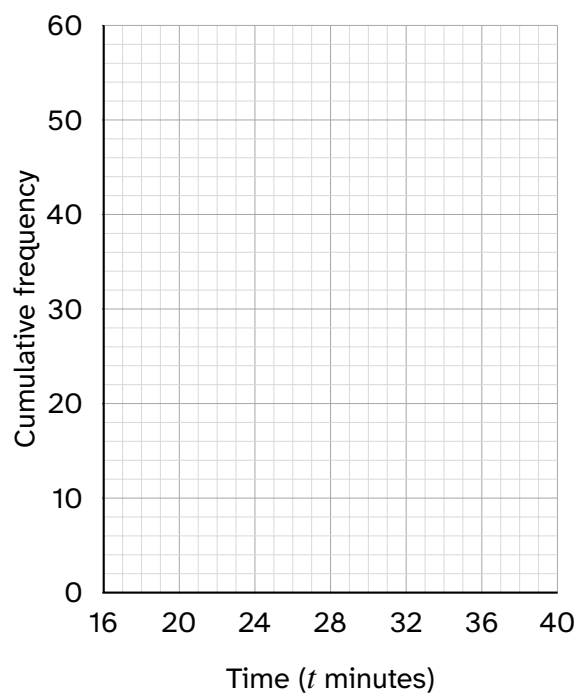
11 Prove algebraically that $0.5\dot{6} = \frac{17}{30}$

[3 marks]

- 12 The table shows the times taken by 60 runners to complete a 5 km fun run.

Time (t minutes)	Frequency	Cumulative frequency
$16 < t \leq 20$	4	
$20 < t \leq 24$	11	
$24 < t \leq 28$	19	
$28 < t \leq 32$	14	
$32 < t \leq 36$	8	
$36 < t \leq 40$	4	

- (a) On the grid, draw a cumulative frequency graph for the data.
You may use the table to help you.



[2 marks]

- (b) The organisers say,
“More than a quarter of the runners took longer than 30 minutes.”
Use your graph to decide whether the organisers are correct.
Tick a box. Show how you decide.

[2 marks]

☐ Yes ☐ No

13 A garden centre sells pots of herbs and trays of seedlings.

Maya buys 3 pots of herbs and 4 trays of seedlings.

She pays £23.30

Leo buys 5 pots of herbs and 2 trays of seedlings.

He pays £21.10

Work out the cost of one pot of herbs and the cost of one tray of seedlings.

You must show your working.

[3 marks]

Pot of herbs £ _____

Tray of seedlings £ _____

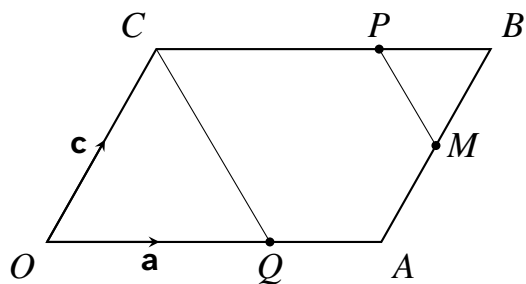
14 $OABC$ is a parallelogram.

$$\overrightarrow{OA} = \mathbf{a} \quad \text{and} \quad \overrightarrow{OC} = \mathbf{c}$$

M is the midpoint of AB .

P is the point on CB such that $CP:PB = 2:1$

Q is the point on OA such that $OQ:QA = 2:1$



Not drawn accurately

Prove that MP is parallel to QC .

[4 marks]

- 15** The brightness, B units, of a lamp at a distance of d metres from the lamp is inversely proportional to d^2

When $d = 4$, $B = 9$

Ana stands 8 metres from the lamp.

She walks directly towards the lamp until the brightness is 16 units.

How far does Ana walk?

[3 marks]

Answer _____ m

- 16** Make x the subject of the formula $y = \frac{2x + 7}{x - 4}$

[3 marks]

$x =$ _____

17 (a) Work out the value of $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

[2 marks]

Answer _____

(b) Write $\frac{4^3 \times \sqrt{2}}{8^3}$ as a power of 2

[2 marks]

Answer _____

- 18** In 2025 the price of a season ticket at a football club increased by 40%
In 2026 the price of the season ticket decreased by 25%

Nina says,

“Over the two years the price has increased by 15%”

Is Nina correct?

Tick a box.

Show working to support your answer.

[3 marks]

☐ Yes

☐ No

- 19** (a) Write $2x^2 - 20x + 41$ in the form $a(x + b)^2 + c$ where a , b and c are integers.
[3 marks]

Answer _____

- (b) Hence, write down the coordinates of the turning point of the curve
 $y = 2x^2 - 20x + 41$

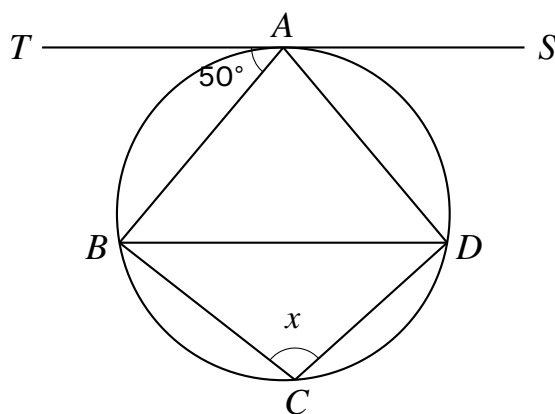
[1 mark]

Answer (_____ , _____)

20 A, B, C and D are points on a circle.

TAS is a tangent to the circle at A .

$AB = AD$



Not drawn accurately

Work out the size of angle x .

You must show your working.

[3 marks]

$x =$ _____ $^\circ$

- 21** Prove that the sum of the squares of any three consecutive odd numbers is always 1 less than a multiple of 12

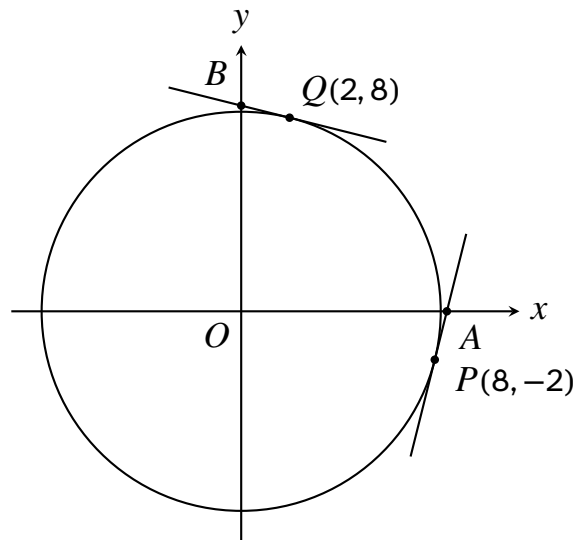
[4 marks]

- 22** Show that $\frac{20}{\sqrt{5}} + \sqrt{45}$ can be written in the form $m\sqrt{5}$, where m is an integer.

[2 marks]

23 A circle has centre $O(0, 0)$.

The points $P(8, -2)$ and $Q(2, 8)$ are on the circle.



Not drawn accurately

- (a) Write down the equation of the circle.

[1 mark]

Answer _____

- (b) The tangent to the circle at P meets the x -axis at A .
The tangent to the circle at Q meets the y -axis at B .

Work out the area of triangle OAB .

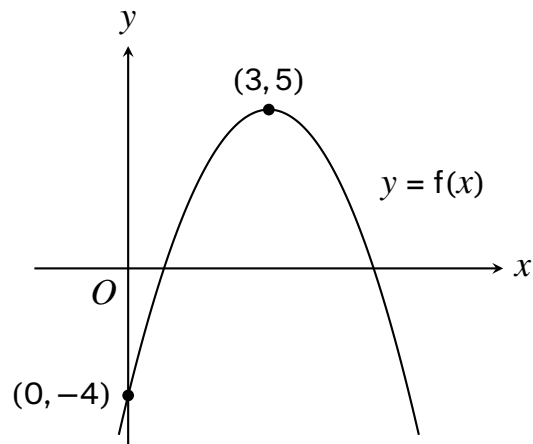
You must show your working.

[5 marks]

Answer _____

24 Here is a sketch of the curve $y = f(x)$

The curve has a maximum point at $(3, 5)$ and crosses the y -axis at $(0, -4)$.



(a) Ravi says,

“The curve $y = f(x + 4)$ has a maximum point at $(7, 5)$ ”

What mistake has Ravi made?

[1 mark]

(b) The curve $y = f(x) + k$ passes through the origin.

Work out the value of k .

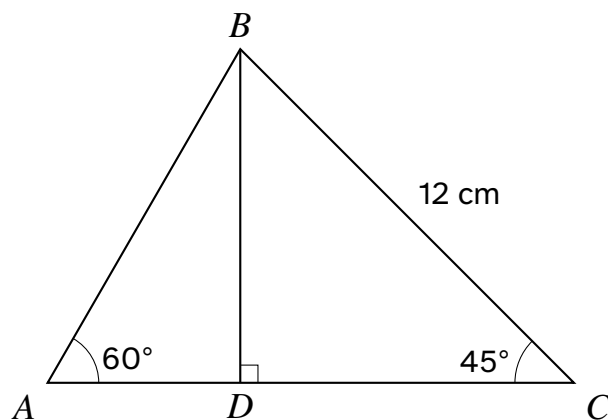
[1 mark]

$k =$ _____

25 ABC is a triangle.

D is the point on AC such that BD is perpendicular to AC .

$BC = 12$ cm angle $BAD = 60^\circ$ angle $BCD = 45^\circ$



Not drawn accurately

Show that $AB = 4\sqrt{6}$ cm

[4 marks]

END OF QUESTIONS

Formulae Sheet

For AQA GCSE Mathematics (8300) • Higher Tier

Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

$$\text{Area of a trapezium} = \frac{1}{2}(a + b)h$$

Volume of a prism = area of cross section $\times$ length

Where r is the radius and d is the diameter:

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

Quadratic formula

The solution of
 $ax^2 + bx + c = 0$
where $a \neq 0$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Pythagoras' Theorem and Trigonometry

In any right-angled triangle where a , b and c are the lengths of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle ABC where a , b and c are the lengths of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

In any triangle ABC where a , b and c are the lengths of the sides:

$$\text{sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is the number of times that the interest is compounded:

$$\text{Total accrued} = P \left(1 + \frac{r}{100} \right)^n$$

Probability

Where $P(A)$ is the probability of outcome A and $P(B)$ is the probability of outcome B :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A \text{ given } B) P(B)$$