GCSE Mathematics · Paper 1 (non-calculator) · Higher tier

Learn with Fred practice paper in the style of AQA · Set A · code LWF-AQAH1-A · not an official AQA paper · the questions were written with AI

90 minutes
80 marks
No calculator

Question booklet. Write all your answers and working in the **answer booklet** (the last pages). Marks for each question are shown in brackets. Diagrams are not accurately drawn.

Formulae you may need

Circumference of a circle = $2\pi r = \pi d$; area of a circle = πr^2

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

Volume of a prism = area of cross section × length

Curved surface area of a cone = πrl; volume of a cone = $\frac{1}{3}\pi r^2 h$

Surface area of a sphere = $4\pi r^2$; volume of a sphere = $\frac{4}{3}\pi r^3$

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

Right-angled triangle: $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$

Quadratic formula, for $ax^2 + bx + c = 0$: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

In triangle ABC, with sides a, b, c opposite angles A, B, C: area = $\frac{1}{2}ab\sin C$

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

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Compound interest: total after n periods = $P\left(1 + \frac{r}{100}\right)^n$, where P is the amount invested and r is the percentage rate for each period

1 [1]

Work out the value of $5 + 2^3 \times 3$

A 23 **B** 29 **C** 39 **D** 1029

2 [1]

Simplify $4a \times 0.5a$

A $2a$ **B** $4.5a$ **C** $2a^2$ **D** $4.5a^2$

3 [1]

Each exterior angle of a regular polygon is 22.5°
How many sides does the polygon have?

A 8 **B** 12 **C** 15 **D** 16

4 [1]

The probability that a delivery van arrives late on any day is 0.15

What is the probability that the van does not arrive late on a given day?

A 0.15 **B** 0.75 **C** 0.85 **D** 1.15

5 [2]

At an allotment, seed potatoes cost £2.85 per kilogram.
Work out the cost of 3.6 kg of seed potatoes.

6 [3]

Sam and Nadia each run laps of a running track.
The distance Sam runs and the distance Nadia runs are in the ratio 3 : 5
Nadia runs 4.8 km further than Sam.

Work out the total distance they run altogether.
You must show your working.

7 [3]

An adult ticket for a theatre show costs £x.
A child ticket costs £3.50 less than an adult ticket.
A family buys 2 adult tickets and 3 child tickets.
The total cost is £71.50

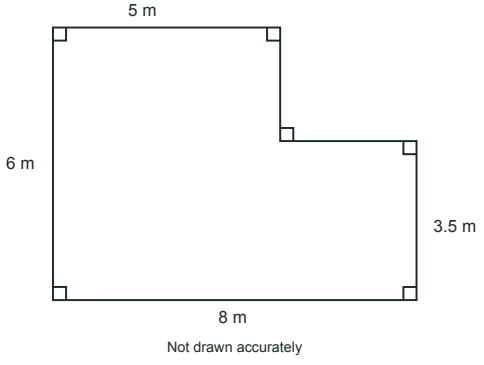
Work out the cost of an adult ticket.
You must show your working.

8 [2]

A mobile data plan allows 3.5×10^9 bytes of data each month.

Work out the total amount of data allowed in one year.
Give your answer in standard form.

9 [3]



Not drawn accurately

The diagram shows the floor plan of the tea tent at a village fete.

Work out the area of the floor.

10 [4]

At the start of last season a football club increased the price of a season ticket by 20%.
At the start of this season the club reduced the price of a season ticket by 15%.
A season ticket now costs £306.
Work out the price of a season ticket before the 20% increase.
You must show your working.

11 [3]

Expand and simplify $(x + 3)(x - 2)(2x - 1)$

12 [3]

A market stall sells bags of oranges.
The table shows the number of oranges in each bag sold one Saturday.

Number of oranges in bag	4	5	6	7
Number of bags	3	x	8	5

The mean number of oranges per bag is 5.6

Work out the value of x.
You must show your working.

13 [3]

Part of a train timetable is shown.

Millbrook depart 08:52
Kingsford arrive 10:16

The distance from Millbrook to Kingsford is 126 km.

Show that the average speed of the train is 25 m/s.
You must show your working.

14 [4]

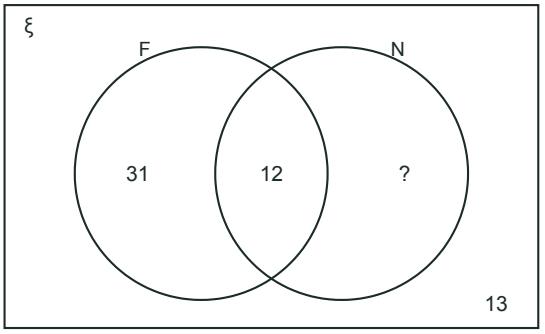
Solve the simultaneous equations

$3x + 4y = 23$
$5x - 2y = 8$

You must show your working.

x = _____ y = _____

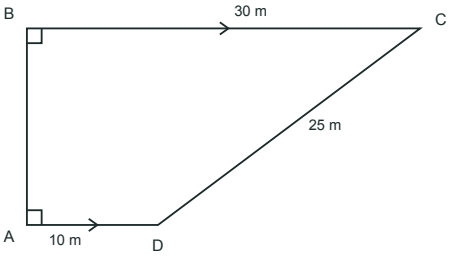
15 [3]



80 customers in a bookshop were asked whether they bought a fiction book (F) or a non-fiction book (N).
The Venn diagram shows some of the results.

One of the customers who bought a non-fiction book is chosen at random.
Work out the probability that this customer also bought a fiction book.
You must show your working.

16 [4]



Not drawn accurately

ABCD is a field on a farm.
AD is parallel to BC.
Angle DAB = angle ABC = 90°
AD = 10 m, BC = 30 m and CD = 25 m

A straight fence is to be built from A to C.

Work out the length of the fence.
Give your answer as a surd in its simplest form.
You must show your working.

17 [3]

Write $(\sqrt{12} + 6)/(\sqrt{3} - 1)$ in the form $a + b\sqrt{3}$, where a and b are integers.
You must show your working.

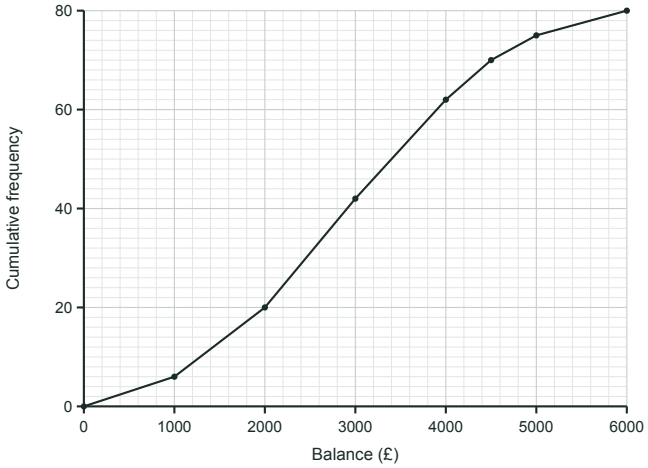
18 [3]

The straight line L has equation $3x + 2y = 8$

The straight line M is perpendicular to L and passes through the point (6, 1).

Work out the coordinates of the point where M crosses the x-axis.
You must show your working.

19 [3]



The cumulative frequency graph shows information about the balances of 80 savings accounts at a bank.

The bank pays a bonus to every account with a balance of more than £4500.

Estimate the percentage of the 80 accounts that receive the bonus.
You must show your working.

20 [3]

The time taken to paint a hall is inversely proportional to the number of painters working.
All painters work at the same rate.

6 painters would take 10 hours to paint the hall.

6 painters start painting the hall at 8 am.
At 12 noon, 2 more painters join them.

Work out the time at which the hall is finished.
You must show your working.

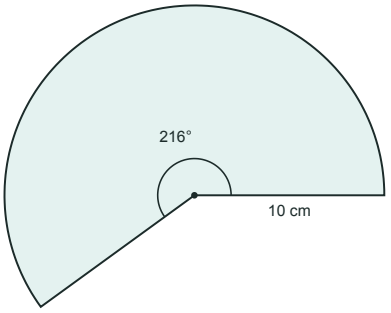
21 [4]

The curve $y = 2x^2 - 12x + 5$ has a turning point M.

(a) [3]
Write $2x^2 - 12x + 5$ in the form $a(x - b)^2 + c$ where a, b and c are integers.

(b) [1]
Write down the coordinates of M.

22 [4]



Not drawn accurately

The diagram shows a sector of a circle of radius 10 cm.
The angle of the sector is 216°.

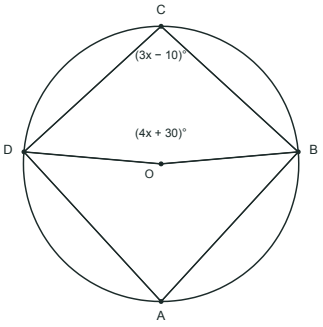
The sector is folded so that the two straight edges meet, making a hollow cone with no base.

Work out the volume of the cone.
Give your answer in terms of π.
You must show your working.

23 [3]

Write $0.3\dot{1}\dot{8}$ as a fraction in its simplest form.
You must show your working.

24 [4]



Not drawn accurately

A, B, C and D are points on the circumference of a circle, centre O.
Angle BOD = (4x + 30)° and angle BCD = (3x − 10)°
Work out the size of angle BAD.
You must give a reason for each step of your working.

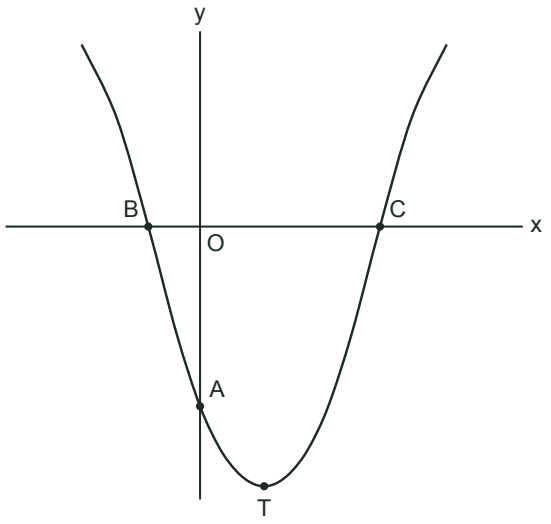
25 [4]

Two grain silos, A and B, on a farm are mathematically similar.
Silo A holds 6400 litres of grain.
Silo B holds 21 600 litres of grain.
The outside surface of silo A has an area of 12 m².
Paint for the outside surface of a silo costs £8.50 per square metre.
Work out the cost of the paint needed for the outside surface of silo B.
You must show your working.

26 [3]

Prove algebraically that the sum of the squares of any two consecutive odd numbers is always 2 more than a multiple of 8.

27 [5]



Not drawn accurately

The diagram shows a sketch of the curve $y = x^2 + px + q$, where p and q are integers.
The turning point of the curve is T (2, −9).
The curve crosses the y-axis at A and crosses the x-axis at B and C.

Work out the area of triangle ABC.
You must show your working.

Answer booklet

80 marks
90 minutes

GCSE Mathematics · Paper 1 (non-calculator) · Higher tier · code LWF-AQAH1-A. Write your working and answers in the boxes. When you have finished, mark your work using the mark scheme that comes with this paper.

Name _____ Date _____

Q1 1 mark · circle one

A 23 **B** 29 **C** 39 **D** 1029

Q2 1 mark · circle one

A $2a$ **B** $4.5a$ **C** $2a^2$ **D** $4.5a^2$

Q3 1 mark · circle one

A 8 **B** 12 **C** 15 **D** 16

Q4 1 mark · circle one

A 0.15 **B** 0.75 **C** 0.85 **D** 1.15

Q5 2 marks

Answer £ _____

Q6 3 marks

Answer _____ km

Q7 3 marks

Answer £ _____

Q8 2 marks

Answer _____ bytes

Q9 3 marks

Answer _____ m²

Q10 4 marks

Answer £ _____

Q11 3 marks

Answer _____

Q12 3 marks

Answer _____

Q13 3 marks

Q14 4 marks

Answer _____

Q15 3 marks

Answer _____

Q16 4 marks

Answer _____ m

Q17 3 marks

Answer _____

Q18 3 marks

Answer _____

Q19 3 marks

Answer _____ %

Q20 3 marks

Answer _____

Q21(a) 3 marks

Answer _____

Q21(b) 1 mark

Answer _____

Q22 4 marks

Answer _____ cm^3

Q23 3 marks

Answer _____

Q24 4 marks

Answer _____ °

Q25 4 marks

Answer £ _____

Q26 3 marks

Q27 5 marks

Answer _____ square units

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