

Surname

Other names

Centre Number

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Candidate Number

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GCSE Mathematics 8300/2H

Predicted Practice Paper

PAPER 2 (Calculator)

Higher Tier

Predicted paper for Summer 2027 examinations

Written in the style of the AQA 8300 specification

Time: 1 hour 30 minutes

Total marks: 80

IMPORTANT — PLEASE READ: PREDICTED PRACTICE PAPER — not an official AQA paper, not a past paper, and not endorsed by or affiliated with AQA. All questions are original. Topics were chosen by analysing previous exam papers, but they are NOT guaranteed to appear in any real examination. Revise the full specification.

For this paper you must have:

A calculator, mathematical instruments (ruler graduated in centimetres and millimetres, protractor, pair of compasses), pen, HB pencil, eraser. Tracing paper may be used. A formulae sheet is provided on the next page.

Instructions

- Answer every question.
- Write your answers in the spaces provided and show all your working clearly.
- You may use a calculator in this paper.
- Diagrams are not drawn accurately unless the question says otherwise.

Information

- The paper is worth 80 marks in total.
- The marks available for each question are shown in brackets — use them to judge how long to spend.

Advice

- Read each question carefully before you begin.
- Attempt every question, even if you are unsure.
- If you finish early, use the time to check your answers.

Turn over

Formulae Sheet

Volume of a prism	area of cross-section $\times$ length
Volume of a sphere	$\frac{4}{3} \pi r^3$
Surface area of a sphere	$4\pi r^2$
Volume of a cone	$\frac{1}{3} \pi r^2 h$
Curved surface area of a cone	$\pi r l$
Sine rule	$a / \sin A = b / \sin B = c / \sin C$
Cosine rule	$a^2 = b^2 + c^2 - 2bc \cos A$
Area of a triangle	$\frac{1}{2} ab \sin C$
Quadratic formula	$x = [-b \pm \sqrt{(b^2 - 4ac)}] / 2a$
Compound interest	final amount = $P \times (1 + r/100)^n$

In all calculations, show clearly how you work out your answer.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write 180 as a product of its prime factors.

Give your answer in index form.

(Total for Question 1 is 2 marks)

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

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

(Total for Question 2 is 2 marks)

DO NOT WRITE IN THIS AREA

3 (a) Write 0.00052 in standard form.

----- (1)

(b) Work out $(4 \times 10^6) \times (2.5 \times 10^{-3})$. Give your answer in standard form.

----- (2)

(Total for Question 3 is 3 marks)

DO NOT WRITE IN THIS AREA

4 In a sale, all prices are reduced by 20%.
The sale price of a jacket is £96.
Work out the original price of the jacket.
You must show your working.

(Total for Question 4 is 3 marks)

DO NOT WRITE IN THIS AREA

5 A rectangle has length 12.5 cm and width 8.4 cm.
Both measurements are given to the nearest 0.1 cm.

(a) Write down the error interval for the length.

----- (1)

(b) Work out the greatest possible area of the rectangle.

----- (2)

(Total for Question 5 is 3 marks)

DO NOT WRITE IN THIS AREA

6 Simplify $3\sqrt{20} - \sqrt{45}$.

Give your answer in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible.

(Total for Question 6 is 2 marks)

DO NOT WRITE IN THIS AREA

7 Priya and Sam share some money in the ratio 4 : 7.
Sam receives £45 more than Priya.
Work out the total amount of money shared.

(Total for Question 7 is 3 marks)

DO NOT WRITE IN THIS AREA

- 8** (a) y is inversely proportional to x^2 . When $x = 3$, $y = 8$. Work out the value of y when $x = 6$.

----- (2)

- (b) y is directly proportional to x . When $x = 5$, $y = 35$. Work out the value of y when $x = 9$.

----- (2)

(Total for Question 8 is 4 marks)

DO NOT WRITE IN THIS AREA

9 A rectangle has length $(3x + 2)$ cm and width $(x + 1)$ cm.
The perimeter of the rectangle is 54 cm.
Work out the value of x .

(Total for Question 9 is 3 marks)

DO NOT WRITE IN THIS AREA

10 The straight line L passes through the points (2, 7) and (6, 19).
Find the equation of L in the form $y = mx + c$.

(Total for Question 10 is 3 marks)

DO NOT WRITE IN THIS AREA

11 £6000 is invested at a compound interest rate of 2.5% per year.
Work out the value of the investment after 3 years.
Give your answer to the nearest penny.
You must show your working.

(Total for Question 11 is 2 marks)

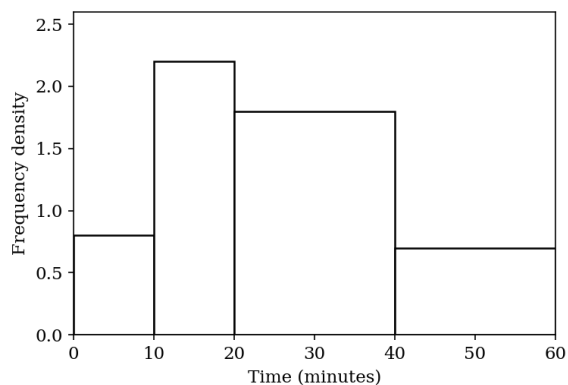
DO NOT WRITE IN THIS AREA

12 y is directly proportional to the cube of x .
 x is increased by 20%.
Work out the percentage increase in y .
You must show your working.

(Total for Question 12 is 3 marks)

DO NOT WRITE IN THIS AREA

- 13** The histogram shows the time, in minutes, that 80 customers spent in a shop.



- (a) Write down the frequency density for the group $20 < t \leq 40$.

..... (1)

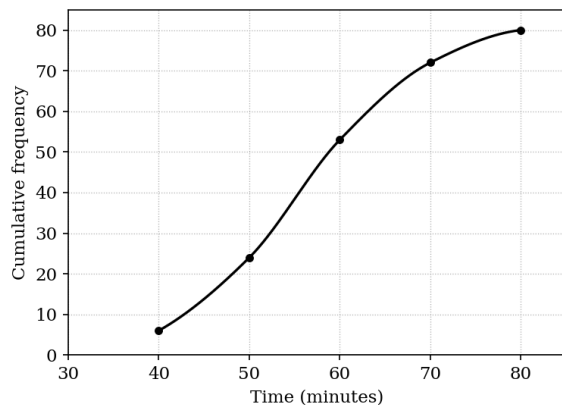
- (b) Estimate the total time, in minutes, spent by all 80 customers.

..... (2)

(Total for Question 13 is 3 marks)

DO NOT WRITE IN THIS AREA

- 14** The cumulative frequency graph shows the times, in minutes, taken by 80 runners to complete a race.



- (a) Use the graph to estimate the median time.

----- (1)

- (b) Use the graph to estimate the number of runners who took less than 45 minutes to complete the race.

----- (2)

(Total for Question 14 is 3 marks)

DO NOT WRITE IN THIS AREA

15 Solve $3x^2 - 7x - 5 = 0$.

Give your answers to 2 decimal places.

You must show your working.

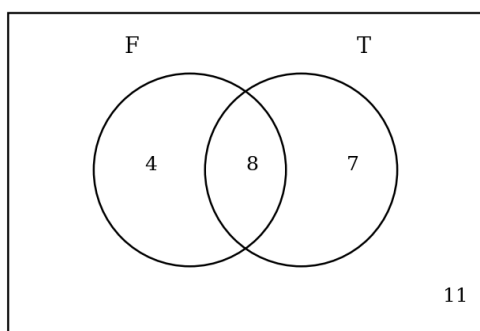
(Total for Question 15 is 3 marks)

DO NOT WRITE IN THIS AREA

16 The Venn diagram shows information about 30 students.

F is the set of students who play football.

T is the set of students who play tennis.



(a) Work out the probability that a student chosen at random plays football only.

----- (1)

(b) A student who plays tennis is chosen at random. Work out the probability that this student also plays football.

----- (1)

(Total for Question 16 is 2 marks)

DO NOT WRITE IN THIS AREA

17 Triangle ABC is right-angled at C.

$AC = 8.5$ cm.

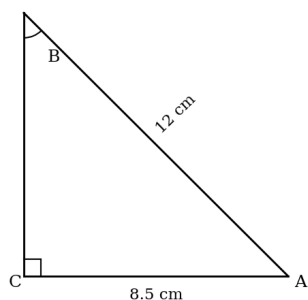
$AB = 12$ cm.

Work out the size of angle ABC.

Give your answer to 1 decimal place.

You must show your working.

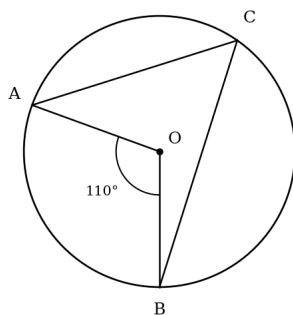
Diagram not drawn accurately.



DO NOT WRITE IN THIS AREA

(Total for Question 17 is 3 marks)

18 A, B and C are points on the circumference of a circle with centre O.
Angle $AOB = 110^\circ$.
Work out the size of angle ACB.
Give a reason for your answer.
Diagram not drawn accurately.



DO NOT WRITE IN THIS AREA

(Total for Question 18 is 2 marks)

19 Solve the simultaneous equations

$$x^2 + y^2 = 65$$

$$y = x + 3$$

You must show your working.

DO NOT WRITE IN THIS AREA

(Total for Question 19 is 4 marks)

20 The iteration formula

$$x_{n+1} = (x_n^3 + 5) / 8$$

can be used to find an approximate solution to the equation $x^3 - 8x + 5 = 0$.

Use the formula with $x_0 = 1$ to find the value of x_3 .

Give your answer to 1 decimal place.

DO NOT WRITE IN THIS AREA

(Total for Question 20 is 3 marks)

21 Make x the subject of the formula

$$y = (3x + 1) / (x - 4)$$

(Total for Question 21 is 3 marks)

DO NOT WRITE IN THIS AREA

22 The first four terms of a quadratic sequence are
5, 12, 23, 38.

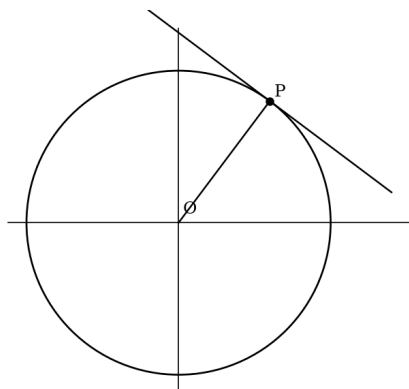
Find an expression, in terms of n , for the n th term of the sequence.

(Total for Question 22 is 3 marks)

DO NOT WRITE IN THIS AREA

23 The circle with equation $x^2 + y^2 = 25$ is shown.

P is the point (3, 4) on the circle.



(a) Write down the gradient of the line OP.

..... (1)

(b) Find the equation of the tangent to the circle at P.

..... (2)

(Total for Question 23 is 3 marks)

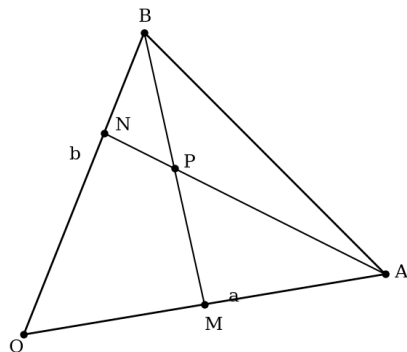
DO NOT WRITE IN THIS AREA

24 OAB is a triangle.

Vector $OA = a$ and vector $OB = b$.

M is the midpoint of OA.

N is the point on OB such that $ON : NB = 2 : 1$.



(a) Write down the vector AN in terms of a and b.

(1)

DO NOT WRITE IN THIS AREA

(b) The lines AN and BM intersect at P. Find the vector OP in terms of a and b. Give your answer in its simplest form.

(4)

(Total for Question 24 is 5 marks)

DO NOT WRITE IN THIS AREA

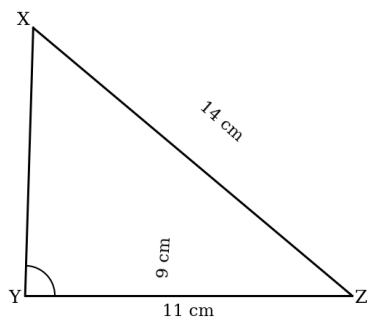
25 n is an integer.

Prove that $(n + 3)^2 - (n - 3)^2$ is always a multiple of 12.

(Total for Question 25 is 3 marks)

DO NOT WRITE IN THIS AREA

26 In triangle XYZ,
 $XY = 9 \text{ cm}$, $YZ = 11 \text{ cm}$ and $XZ = 14 \text{ cm}$.
Work out the size of angle XYZ.
Give your answer to 1 decimal place.
You must show your working.
Diagram not drawn accurately.



DO NOT WRITE IN THIS AREA

(Total for Question 26 is 3 marks)

27 A bag contains 4 red counters and some blue counters.
Elena takes two counters from the bag at random, without replacement.
The probability that both counters are red is $\frac{1}{6}$.
Work out the total number of counters in the bag.
You must show your working.

DO NOT WRITE IN THIS AREA

(Total for Question 27 is 4 marks)

END OF QUESTIONS