GCSE Mathematics Practice Tests: Set 18

Paper 1H (Non-calculator)

Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need*.
- **Calculators may be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The total mark for this paper is 80
- Questions are in order of mean difficulty as found by students achieving Grade 7.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question*.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer all SEVENTEEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (*a*) Simplify $e^8 \div e^2$

....

(1)

(*b*) Expand and simplify $(x - 3)(x + 1)$

....

(2)

(Total for Question 1 is 3 marks)

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2 Find the value of p, given that $\frac{7^8 \times 7^2}{7^p} = 7^6$

$p =$ ....

(Total for Question 2 is 2 marks)

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3 (a) Simplify $(3x^2y)^0$

....

(1)

(b) (i) Factorise $x^2 - 5x - 36$

....

(2)

(ii) Hence solve $x^2 - 5x - 36 = 0$

....

(1)

(Total for Question 3 is 4 marks)

4 (*a*) Simplify $\left(64p^9q^{12}\right)^{\frac{2}{3}}$

.

....
(2)

(*b*) Write as a single fraction $\dfrac{2}{3x}+\dfrac{4}{5x}+-\dfrac{9}{10x}$

Give your answer in its simplest form.

....
(2)

(*c*) Expand and simplify $4x(x - 5)(2x + 3)$
Show your working clearly.

....

(3)

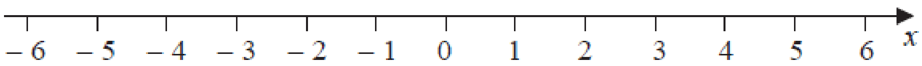
(Total for Question 4 is 7 marks)

5 (i) Solve the inequalities $-7 \leq 2x - 3 < 5$

....

(3)

(ii) On the number line, represent the solution set to part (i)



(2)

(Total for Question 5 is 5 marks)

6 The table gives information about the times taken by 90 runners to complete a 10 km race.

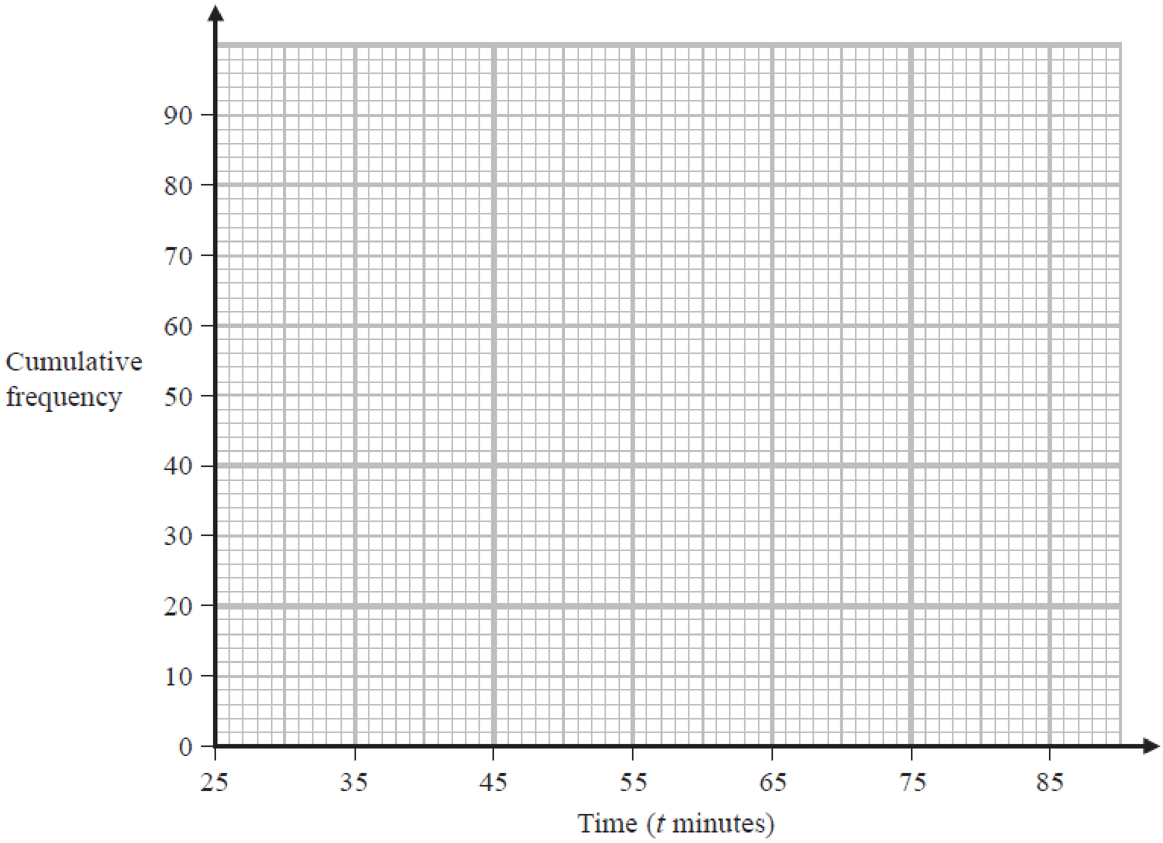
Time (t minutes)	**Frequency**
$25 < t \leq 35$	12
$35 < t \leq 45$	24
$45 < t \leq 55$	28
$55 < t \leq 65$	12
$65 < t \leq 75$	10
$75 < t \leq 85$	4

(*a*) Complete the cumulative frequency table.

Time (t minutes)	**Cumulative frequency**
$25 < t \leq 35$	12
$25 < t \leq 45$	
$25 < t \leq 55$	
$25 < t \leq 65$	
$25 < t \leq 75$	
$25 < t \leq 85$	

(1)

(*b*) On the grid below, draw a cumulative frequency graph for your table.



(2)

Any runner who completed the race in a time T minutes such that $42 < T \leq 52$ minutes was awarded a silver medal.

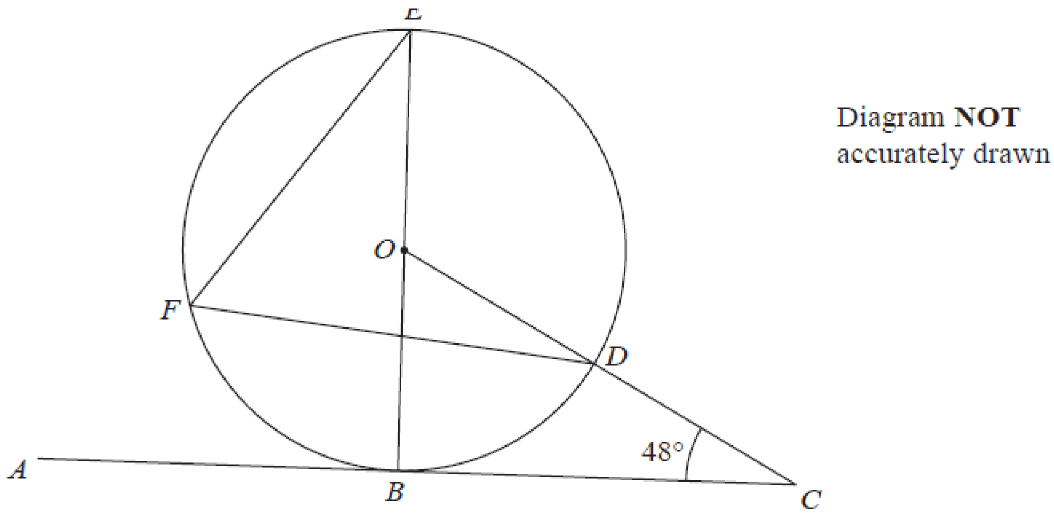
(*c*) Use your graph to find an estimate for the number of runners who were awarded a silver medal.

.... runners

(2)

(Total for Question 6 is 5 marks)

7



B, *D*, *E* and *F* are points on a circle, centre *O*.
ABC is a tangent to the circle.
ODC is a straight line.

BOE is a diameter of the circle.

Angle $BCD = 48°$

Find the size of angle *DFE*.

....°

(Total for Question 7 is 3 marks)

8 The functions f and g are such that

$$\mathrm{f}(x) = 2x - 3$$
$$\mathrm{g}(x) = \frac{x}{3x+1}$$

(*a*) Find gf(x)
Simplify your answer.

gf(x) = ...

(2)

(*b*) Express the inverse function g^{-1} in the form $\mathrm{g}^{-1}(x) = \ldots$

$\mathrm{g}^{-1}(x)$ = ...

(3)

(Total for Question 8 is 5 marks)

9 (*a*) Factorise $6y^2 - y - 5$

....

(2)

(*b*) Make f the subject of $w = \dfrac{2f+3}{8-f}$

....

(3)

(*c*) Express $4x^2 - 8x + 7$ in the form $a(x + b)^2 + c$ where a, b and c are integers.

....

(3)

(Total for Question 9 is 8 marks)

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10 Express $\dfrac{8}{\sqrt{5}-1}$ in the form $\sqrt{a}+b$ where a and b are integers.

Show each stage of your working clearly.

....

(Total for Question 10 is 3 marks)

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11 The straight line **L** has equation $x - y = 3$
The curve **C** has equation $3x^2 - y^2 + xy = 9$

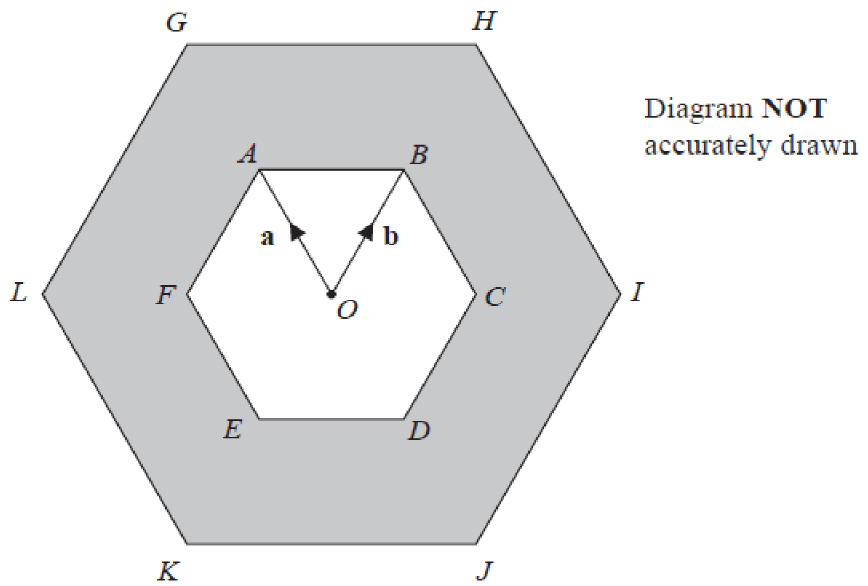
L and **C** intersect at the points P and Q.

Find the coordinates of the midpoint of PQ.
Show clear algebraic working.

(.......................... , ...)

(Total for Question 11 is 6 marks)

12 *ABCDEF* and *GHIJKL* are regular hexagons each with centre *O*.



GHIJKL is an enlargement of *ABCDEF*, with centre *O* and scale factor 2

$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = \mathbf{b}$

(*a*) Write the following vectors, in terms of **a** and **b**.
Simplify your answers.

(i) $\overrightarrow{AB}$

....
(1)

(ii) $\overrightarrow{KI}$

....
(2)

(iii) $\overrightarrow{LD}$

....
(2)

The triangle *OAB* has an area of 5 cm^2

(*b*) Calculate the area of the shaded region.

.... cm^2

(3)

(Total for Question 12 is 8 marks)

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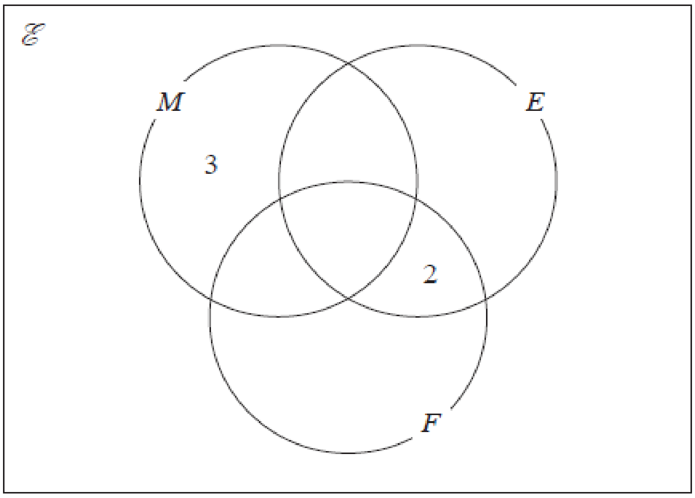
13 There are 32 students in a class.
In one term these 32 students each took a test in Maths (M), in English (e) and in French (F).

25 students passed the test in Maths.
20 students passed the test in English.
14 students passed the test in French.
18 students passed the tests in Maths and English.
11 students passed the tests in Maths and French.
4 students failed all three tests.
x students passed all three tests.

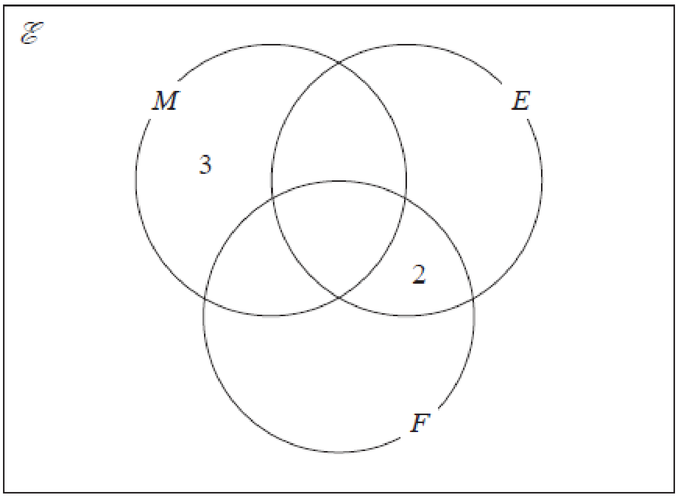
The incomplete Venn diagram gives some more information about the results of the 32 students.



(a) Use all the given information about the results of students who passed the test in Maths to find the value of x.

x = ...
(2)

(b) Use your value of x to complete the Venn diagram to show the number of students in each subset.



(2)

A student who passed the test in Maths is chosen at random.

(c) Find the probability that this student failed the test in French.

....

(1)

(Total for Question 13 is 5 marks)

14 The straight line **L** passes through point A (– 6, 2) and point B (5, 3)
The straight line **M** is perpendicular to **L** and passes through the midpoint of A and B.
The line **M** intersects the line $x = -1$ at point C.

Calculate the area of triangle ABC.

....

(Total for Question 14 is 18 marks)

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15 $0.4\dot{x}$ is a recurring decimal.
x is a whole number such that $1 \leq x \leq 9$

Find, in terms of x, the recurring decimal $0.4\dot{x}$ as a fraction.
Give your fraction in its simplest form.
Show clear algebraic working.

....

(Total for Question 15 is 3 marks)

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16 *ABCED* is a five-sided shape.

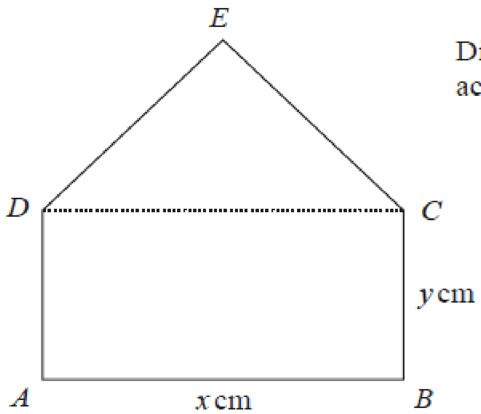

Diagram **NOT** accurately drawn

ABCD is a rectangle.
CED is an equilateral triangle.

$AB = x$ cm $\quad BC = y$ cm

The perimeter of *ABCED* is 100 cm.
The area of *ABCED* is R cm^2

Show that $R = \frac{x}{4}\left(200 - \left[6 - \sqrt{3}\right]x\right)$

(Total for Question 16 is 3 marks)

17 The curve **C** has equation $y = \mathrm{f}(x)$ where $\mathrm{f}(x) = 9 - 3(x + 2)^2$
The point A is the maximum point on **C**.

(*a*) Write down the coordinates of A.

(.......................... , ...)
(1)

The curve **C** is transformed to the curve **S** by a translation of $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$

(*b*) Find an equation for the curve **S**.

....
(1)

The curve **C** is transformed to the curve **T**.
The curve **T** has equation $y = 3(x + 2)^2 - 9$

(*c*) Describe fully the transformation that maps curve **C** onto curve **T**.

....
(1)

(Total for Question 17 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS