GCSE Mathematics Practice Tests: Set 24

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 not 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 TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Solve the simultaneous equations

$$x + 2y = 15$$
$$4x - 6y = 4$$

Show clear algebraic working.

x = ...

y = ...

(Total for Question 1 is 3 marks)

---

2 (*a*) Factorise $y^2 - 3y - 18$

.....

(2)

(*b*) Hence, solve $y^2 - 3y - 18 = 0$

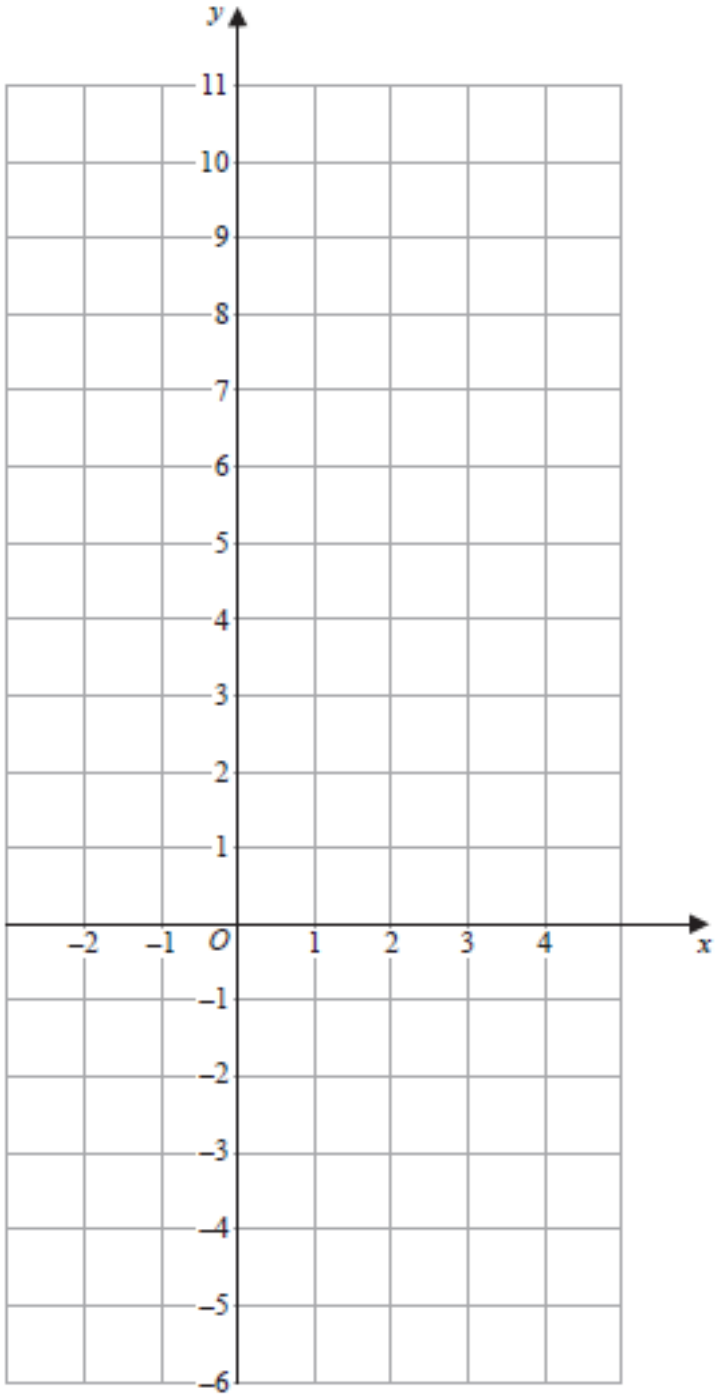
.....

(1)

(Total for Question 2 is 3 marks)

---

3 On the grid, draw the graph of $5x + 2y = 10$ for values of x from -2 to 4



(Total for Question 3 is 3 marks)

4 (*a*) Simplify $\frac{2}{y^0}$

.....

(1)

(*b*) Simplify fully $\left(16a^4\right)^{\frac{3}{4}}$

.....

(2)

(Total for Question 4 is 3 marks)

---

5 Factorise fully $18c^3d^2 - 21c^2$

.....

(Total for Question 5 is 2 marks)

---

6 Here is a list of six numbers written in order of size.

x 5 y z 10 12

The numbers have

a range of 9
a median of 8
a mode of 10

Find the value of x, the value of y and the value of z

x = ...

y = ...

z = ...

(Total for Question 6 is 3 marks)

7 Expand and simplify $5x(3x + 4)(2x – 1)$

.....

(Total for Question 7 is 3 marks)

---

8 Solve $2^{-4x} = 32$

$x =$ .....

(Total for Question 8 is 2 marks)

---

9 (*a*) Write 9.32×10^{-5} as an ordinary number.

.....

(1)

(*b*) Work out $3 \times 10^5 - 6 \times 10^4$
Give your answer in standard form.

.....

(2)

(*c*) Work out $(3 \times 10^{55}) \times (6 \times 10^{65})$
Give your answer in standard form.

.....

(2)

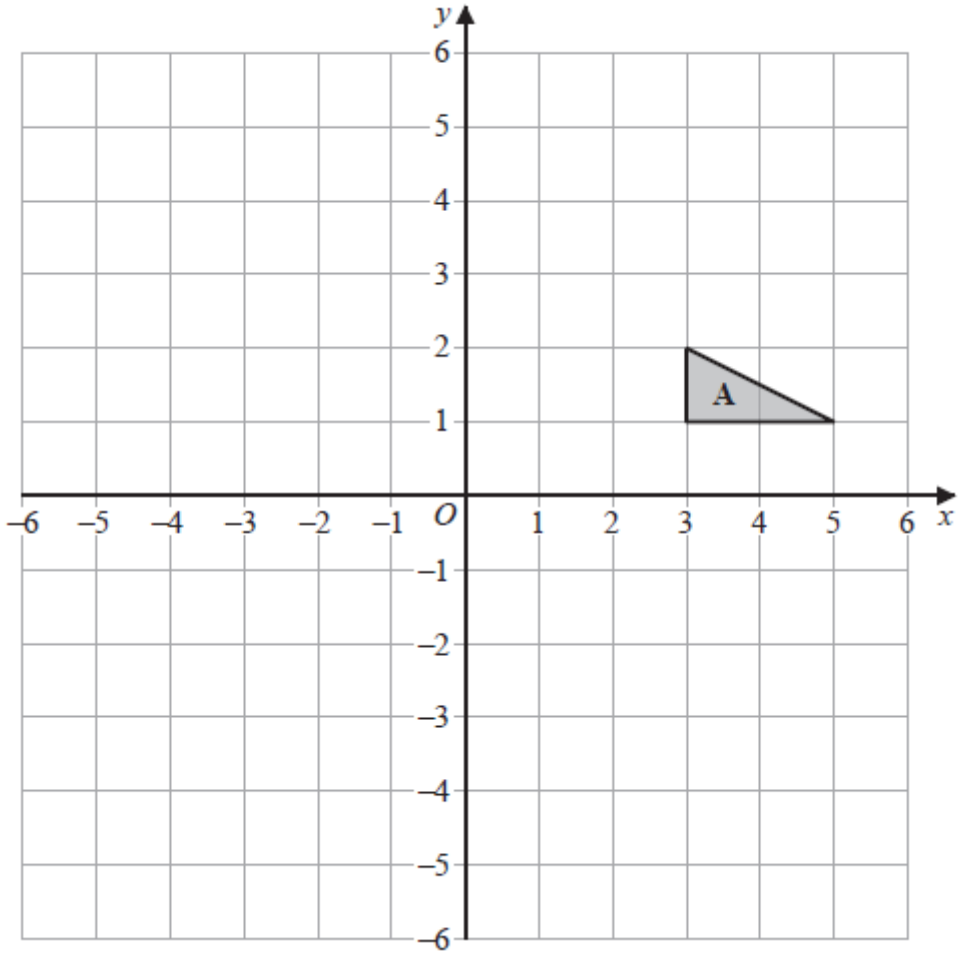
(Total for Question 9 is 5 marks)

---

10 Show that $4\frac{2}{3} \div 1\frac{5}{6} = 2\frac{5}{11}$

(Total for Question 10 is 3 marks)

11



(*a*) On the grid, rotate triangle **A** 180° about (1, –1)
Label the new triangle **B**

(2)

(*b*) On the grid, translate triangle **A** by the vector $\begin{pmatrix} -7 \\ 3 \end{pmatrix}$

Label the new triangle **C**

(1)

(Total for Question 11 is 3 marks)

---

12 The function f is such that

$$f(x) = \frac{2}{3x-5} \quad \text{where } x \neq \frac{5}{3}$$

(*a*) Find $f\left(\frac{1}{3}\right)$

.....

(1)

(*b*) Find $f^{-1}(x)$

$f^{-1}(x)$ = ...

(2)

The function g is such that

$$g(x) = 5x^2 - 20x + 23$$

(*c*) Express $g(x)$ in the form $a(x - b)^2 + c$

.....

(3)

(Total for Question 12 is 6 marks)

13 Here are two vectors.

$$\overrightarrow{BA} = \begin{pmatrix} -5 \\ 4 \end{pmatrix} \qquad \overrightarrow{BC} = \begin{pmatrix} 9 \\ 1 \end{pmatrix}$$

Find $\overrightarrow{AC}$ as a column vector.

(Total for Question 13 is 2 marks)

---

14 $-8 < 2y \leq 2$

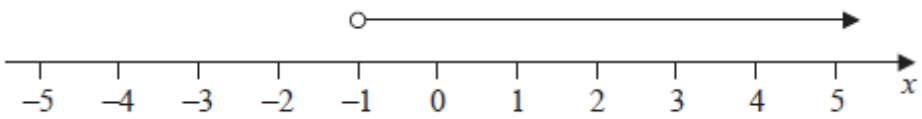
y is an integer.

(*a*) Find all the possible values of y

.....

(2)

(*b*) Write down the inequality shown on the number line.



.....

(1)

(Total for Question 14 is 3 marks)

---

15 Solve the simultaneous equations

$$2y^2 + x^2 = -6x + 42$$
$$2x + y = -3$$

Show clear algebraic working.

.....

(Total for Question 15 is 5 marks)

16 Use algebra to show that $0.38\dot{1}\dot{1} = \frac{21}{55}$

(Total for Question 16 is 2 marks)

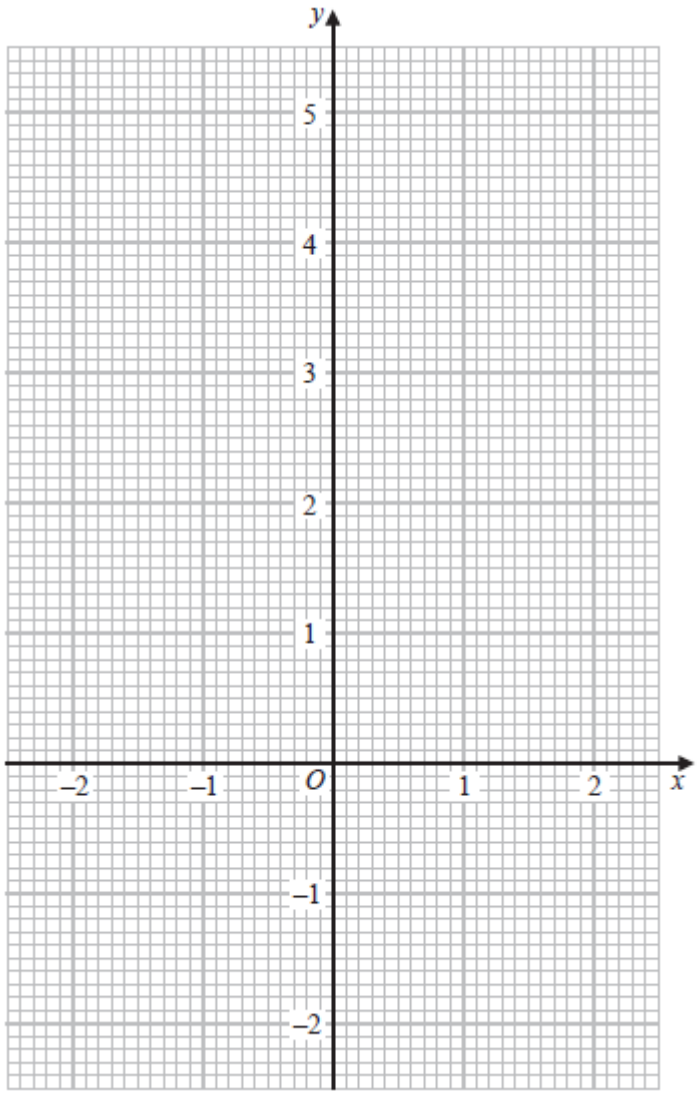
---

17 (*a*) Complete the table of values for $y = x^3 - 3x + 2$

x	–2	–1	–0.5	0	1	1.5	2
y		4	3.4		0	0.9	

(2)

(*b*) On the grid, draw the graph of $y = x^3 - 3x + 2$ for values of x from –2 to 2



(2)

(*c*) By drawing a suitable straight line on the grid, use your graph to find an estimate for the solution of

$$2x^3 - 3x + 4 = 0$$

Give your answer correct to one decimal place.

.....

(3)

(Total for Question 17 is 7 marks)

18 Prove algebraically that, for any three consecutive even numbers,

the sum of the squares of the smallest even number and the largest even number is 8 more than twice the square of the middle even number.

(Total for Question 18 is 3 marks)

19 Solve $\sqrt{3}(x - 2\sqrt{3}) = x + 2\sqrt{3}$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.
Show your working clearly.

$x =$ .....

(Total for Question 19 is 4 marks)

20 Write

$$\frac{4x^2-17x-15}{2x-1}\times\frac{2x^2-7x+3}{x^2-25}+(29-4x)$$

as a single fraction in its simplest form.

.....

(Total for Question 20 is 4 marks)

21 P is inversely proportional to y^2
When $y = 4$, $P = a$

(a) Find a formula for P in terms of y and a

.....

(3)

Given also that y is directly proportional to $\sqrt{x}$ and when $x = a$, $P = 4a$

(b) find a formula for P in terms of x and a

.....

(3)

(Total for Question 21 is 6 marks)

22 The diagram shows triangle OAB with OA extended to E

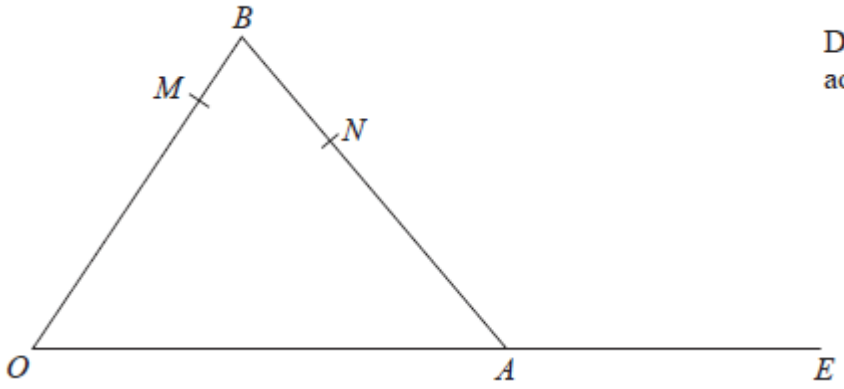


Diagram **NOT** accurately drawn

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

M is the point on OB such that $OM : MB = 4 : 1$
N is the point on AB such that $AN : NB = 3 : 2$
$OA : AE = 5 : 3$

(*a*) Find an expression for $\overrightarrow{ON}$ in terms of **a** and **b**
Give your answer in its simplest form.

$\overrightarrow{ON}$ = ...

(2)

(*b*) Use a vector method to show that *MNE* is a straight line.

(3)

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

BLANK PAGE