

# GCSE Mathematics

## Practice Tests: Set 21

### 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 xx questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** (a) Expand and simplify  $(n - 6)(n + 4)$

.....  
**(2)**

(b) Solve  $2x - 3 = \frac{3x - 5}{4}$

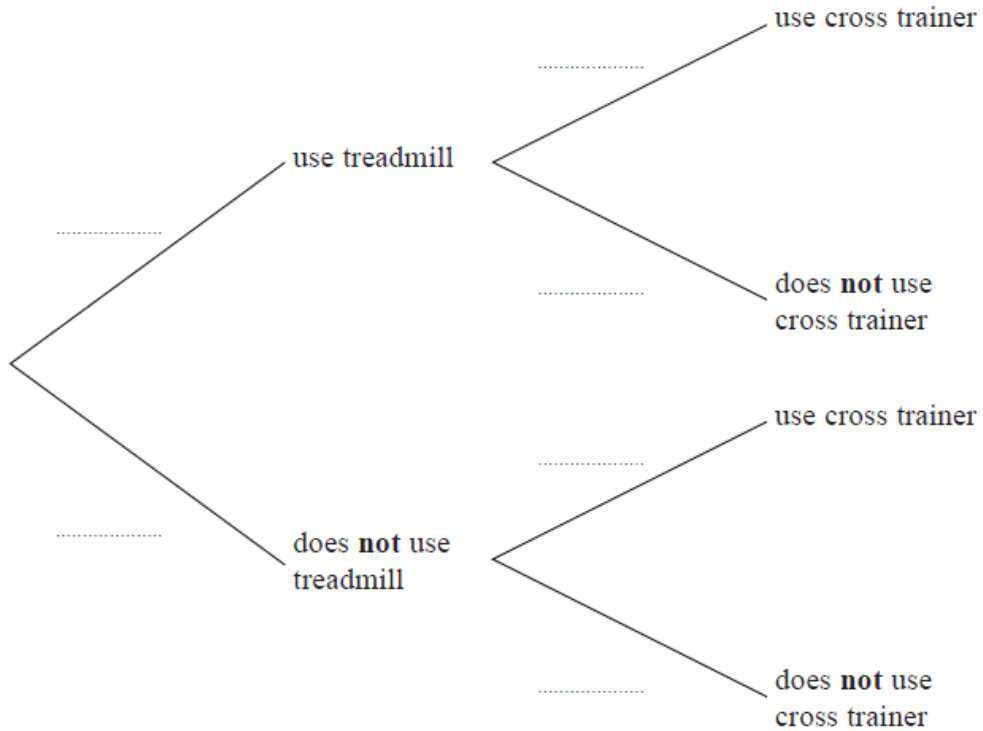
Show clear algebraic working.

$x =$  .....  
**(3)**

**(Total for Question 1 is 5 marks)**

---

- 2 Rudolf goes to the gym.  
 The probability that he will use the treadmill is 0.8  
 When he uses the treadmill, the probability that he will use the cross trainer is 0.3  
 When he does **not** use the treadmill, the probability that he will use the cross trainer is 0.6  
 (a) Complete the probability tree diagram for this information.



(2)

- (b) Work out the probability that Rudolf uses both the treadmill and the cross trainer.

.....  
 (2)

**(Total for Question 2 is 4 marks)**

---

3 (a) Write 0.000 089 in standard form.

.....  
(1)

(b) Write  $8.34 \times 10^4$  as an ordinary number.

.....  
(1)

**(Total for Question 3 is 2 marks)**

---

4 (i) Factorise  $x^2 + 5x - 24$

.....  
(2)

(ii) Hence, solve  $x^2 + 5x - 24 = 0$

.....  
(1)

**(Total for Question 4 is 3 marks)**

---

5 Show that  $5\frac{1}{3} - 2\frac{6}{7} = 2\frac{10}{21}$

**(Total for Question 5 is 3 marks)**

---

6 Here are some integers where  $a < b < c < d$

$a$        $b$        $c$        $d$        $d$        $d$

The mode of the integers is 9  
The median of the integers is 8  
The range of the integers is 4

Work out the value of  $a$ , the value of  $b$ , the value of  $c$  and the value of  $d$

$a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$

$d = \dots\dots\dots$

**(Total for Question 6 is 3 marks)**

---

7 Solve the simultaneous equations

$$7x + 3y = 3$$

$$3x - y = 7$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

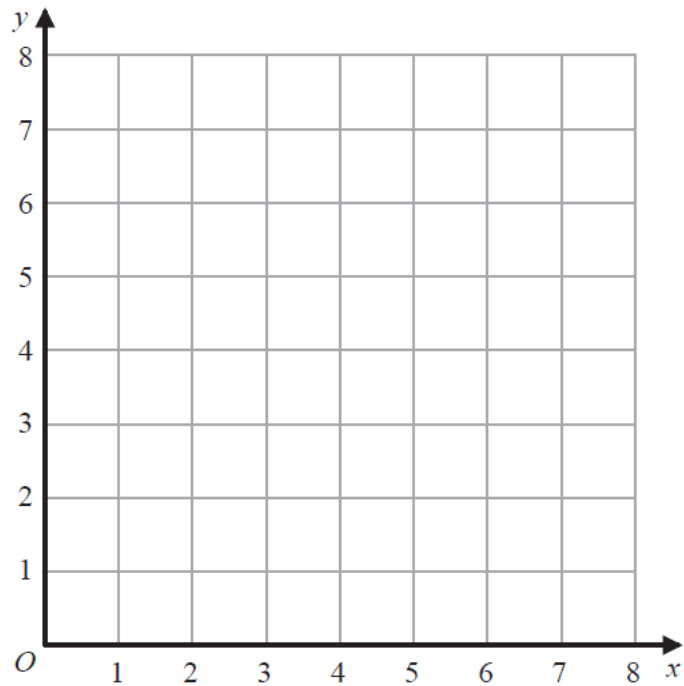
$$y = \dots\dots\dots$$

**(Total for Question 7 is 3 marks)**

---

8 (a) On the grid, draw and label with its equation the straight line with equation

(i)  $y = 1$       (ii)  $x = 2$       (iii)  $x + y = 7$



(3)

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$$y \geq 1 \quad x \geq 2 \quad x + y \leq 7$$

Label the region **R**.

(1)

(Total for Question 8 is 4 marks)



9 (a) Simplify  $8 \times (4t)^0$

.....  
(1)

$$x^6 \div x^{-5} = xp$$

(b) Find the value of  $p$

$p =$  .....  
(1)

(c) Simplify fully  $(2k^2m^4)^3$

.....  
(2)

**(Total for Question 9 is 4 marks)**

---

**10** The table gives information about the ages, in years, of 80 people in a train carriage.

Age ( $a$ years)	Frequency
$0 < a \leq 20$	7
$20 < a \leq 30$	25
$30 < a \leq 40$	20
$40 < a \leq 50$	14
$50 < a \leq 60$	8
$60 < a \leq 70$	6

(a) Complete the cumulative frequency table.

Age ( $a$ years)	Cumulative frequency
$0 < a \leq 20$	
$20 < a \leq 30$	
$30 < a \leq 40$	
$40 < a \leq 50$	
$50 < a \leq 60$	
$60 < a \leq 70$	

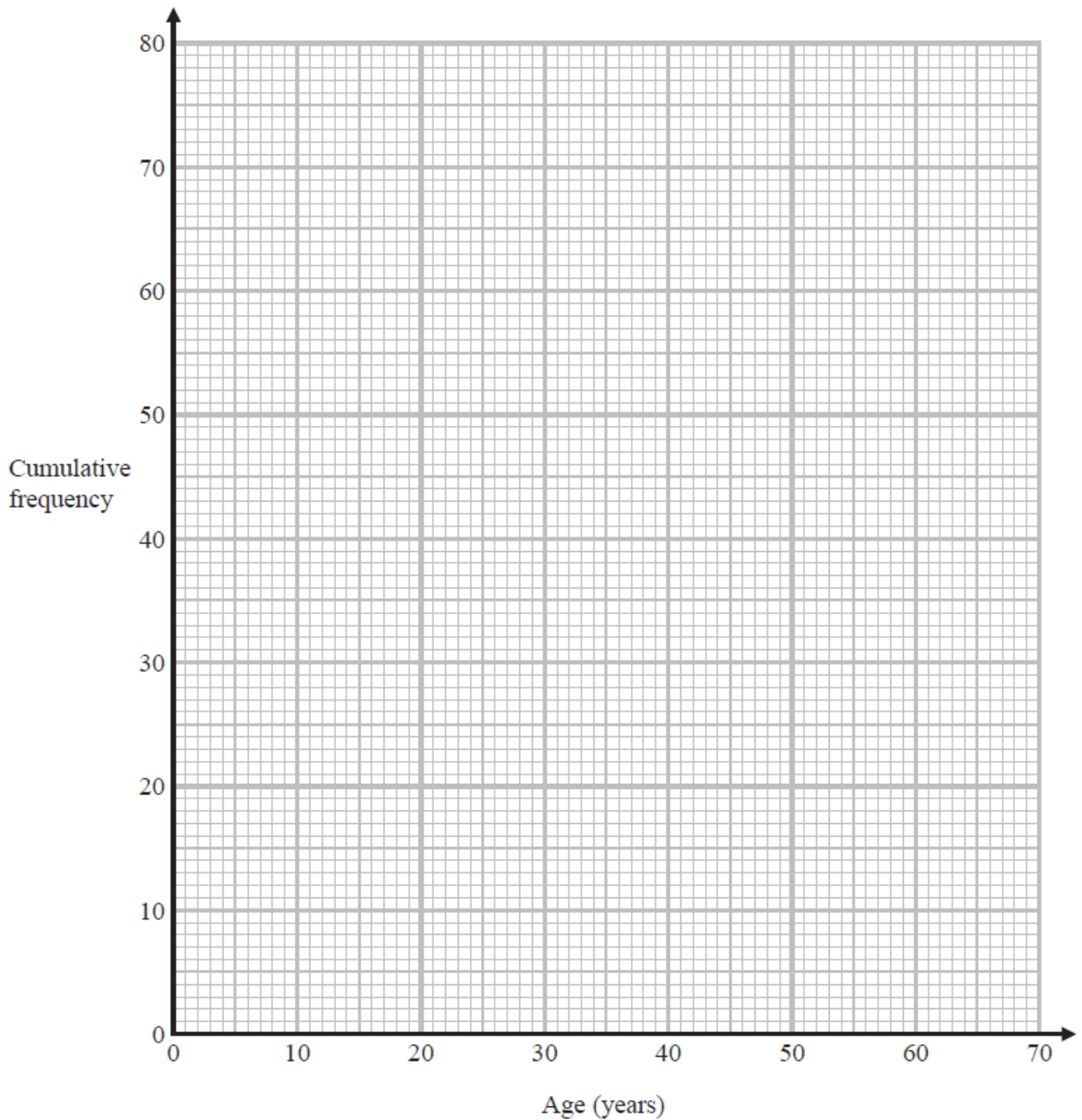
(1)

(b) On the grid on the next page, draw a cumulative frequency graph for your table.

(2)

(c) Use your graph to find an estimate for the median age of the 80 people.

..... years  
(1)



Of the people in the train carriage, 60% of those who are aged between 18 and 65 are going to work. None of the other people in the train carriage are going to work.

- (d) Use your graph to find an estimate for the number of people in the train carriage who are going to work.

.....

**(3)**

**(Total for Question 10 is 7 marks)**

11 100 farmers are asked if they have goats ( $G$ ), sheep ( $S$ ) or chickens ( $C$ ) on their farms.

Of these farmers

31 have sheep

53 have chickens

6 have goats, sheep and chickens

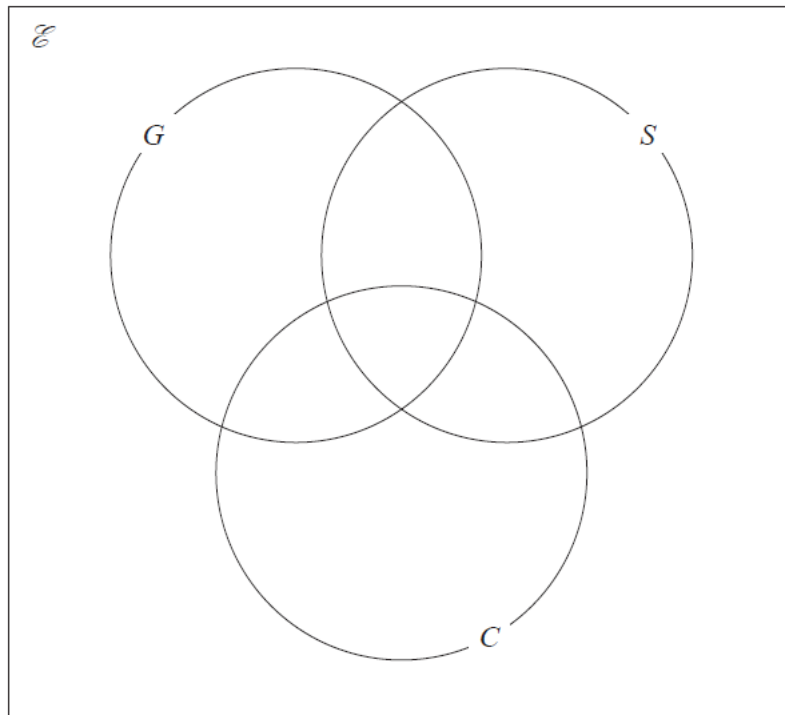
11 have sheep and goats

17 have sheep and chickens

18 have goats and chickens

20 do not have any goats, sheep or chickens

(a) Using this information, complete the Venn diagram to show the number of farmers in each appropriate subset.



(Total for Question 11 is 3 marks)

**12** Here are the first five terms of an arithmetic sequence.

1      5      9      13      17

(a) Find an expression, in terms of  $n$ , for the  $n$ th term of this sequence.

.....  
(2)

The  $n$ th term of another arithmetic sequence is  $3n + 5$

(b) Find an expression, in terms of  $m$ , for the  $(2m)$ th term of this sequence.

.....  
(1)

**(Total for Question 12 is 3 marks)**

---

- 13 (a) Solve  $\frac{4x+5}{3} - \frac{3-2x}{2} = 13$   
Show clear algebraic working.

$x = \dots\dots\dots$   
**(4)**

- (b) Solve the inequality  $2y^2 - 7y - 30 \leq 0$   
Show your working clearly.

$\dots\dots\dots$   
**(3)**

**(Total for Question 13 is 7 marks)**

---

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

.....  
(3)

- (b) Make  $c$  the subject of  $g = \frac{c+3}{4+c} - 7$

.....  
(4)

(Total for Question 14 is 7 marks)

---

15 The function  $f$  is defined as

$$f : x \mapsto \frac{2x}{x-6} \quad x \neq 6$$

(a) Find  $f(10)$

.....  
(1)

(b) Express the inverse function  $f^{-1}$  in the form  $f^{-1} : x \mapsto \dots$

$f^{-1} : x \mapsto \dots$   
(3)

**(Total for Question 15 is 4 marks)**

---



**16** (a) Factorise  $9x^2 - 4y^2$

.....  
**(2)**

(b) Express  $\frac{7}{8} - \frac{x+3}{4x}$  as a single fraction in its simplest form.

.....  
**(3)**

**(Total for Question 16 is 5 marks)**

---

17  $a = \frac{14}{3x-7}$       $x = \frac{7}{4y-3}$

Express  $a$  in the form  $\frac{py+q}{ry+s}$  where  $p, q, r$  and  $s$  are integers.

Give your answer in its simplest form.

$a = \dots\dots\dots$

**(Total for Question 17 is 3 marks)**

---

**18** Without using a calculator, show that  $\frac{12}{\sqrt{2}-1} - (\sqrt{2})^5 = 2\sqrt{32} + 12$

Show your working clearly.

**(Total for Question 18 is 3 marks)**

---

19

$$\frac{18 \times (\sqrt{27})^{4n+6}}{6 \times 9^{2n+8}} = 3^x$$

Express  $x$  in terms of  $n$

Show your working clearly and simplify your expression.

$x = \dots\dots\dots$

**(Total for Question 19 is 3 marks)**

---

**20** Express each of  $a$ ,  $b$  and  $c$  in terms of  $q$  so that

$$q + 12x - qx^2$$

can be written as  $a - b(x - c)^2$

$a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$

**(Total for Question 20 is 4 marks)**

---

**TOTAL FOR PAPER IS 80 MARKS**