edexcel

GCSE Mathematics Practice Tests: Set 4

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.

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
- 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.

ALWAYS LEARNING PEARSON

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Write these numbers in order of size.
Start with the smallest number.

2^5 $\quad 64^{\frac{1}{2}}$ $\quad 4^3$ $\quad 8^{\frac{1}{3}}$ $\quad 16$ $\quad 64^0$

You must show clearly how you got your answer.

$2^5 = 2\times2\times2\times2\times2 = 32$
$64^{1/2} = \sqrt{64} = 8$
$4^3 = 4\times4\times4 = 64$
$8^{1/3} = \sqrt[3]{8} = 2$
$64^0 = 1$

Smallest (64^0)
$8^{1/3}$
$64^{1/2}$
16
2^5
Biggest (4^3)

(Total 3 marks)

2. There are 50 counters in a bag.

The counters are blue or yellow or black or white.
A counter is taken at random from the bag.

The table shows each of the probabilities that the counter will be blue or black or white.

Colour	blue	yellow	black	white
Probability	0.4		0.3	0.16

Work out the number of yellow counters in the bag.

Probability outcomes must equal 1.
Hence, prob. yellow = 1 − Prob. (blue + black + white)
" " = 1 − (0.4 + 0.3 + 0.16) = 0.14

No of yellow counter = 0.14 × 50
= 7

.... 7

(Total 4 marks)

3. Buses to Acton leave a bus station every 24 minutes.
Buses to Barton leave the same bus station every 20 minutes.

A bus to Acton and a bus to Barton both leave the bus station at 9 00 a.m.

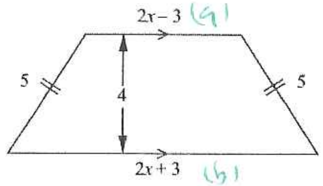
When will a bus to Acton and a bus to Barton next leave the bus station at the same time?

Buses to Acton (Every 24 mins)	Buses to Barton (Every 20 mins)
48 (24×2)	40 (20×2)
72 (24×3)	60 (20×3)
96 (24×4)	80 (20×4)
120 (24×5)	100 (20×5)
	120 20×6

L.C.M 24 and 20 gives 120 mins = 2 hrs
9.00 + 2 hrs = 11.00 Am .... 11.00 Am

(Total 3 marks)

4. Here is a trapezium.



All the measurements are in cm.
The area of the trapezium is 18 cm².

Calculate the numerical value of the perimeter of the trapezium.

$A = \frac{1}{2}(a+b)h$

$18 = \frac{1}{\cancel{2}}\left[(2x-3)+(2x+3)\right] \times \cancel{4}$

$18 = 2\left[(2x-3)+(2x+3)\right]$

divide both sides by 2

$9 = (2x-3)+(2x+3)$

$9 = 2x\cancel{-3}+2x\cancel{+3}$

$9 = 4x$

$x = \frac{9}{4} = 2.25\text{cm}$

Perimeter $= 5+5+(2x-3)+(2x+3)$

$= 5+5+2(2.25)-3+2(2.25)+3$

$= 5+5+4.5\cancel{-3}+4.5\cancel{+3}$

$P = 19\text{cm}$

..........19 cm..........cm

(Total 6 marks)

5. The normal price of a television is reduced by 30% in a sale.

The sale price of the television is £350

Work out the normal price of the television.

Let Normal Price $= x$

Reduction $= 30\% = 0.3x$

Sale Price $= 0.7x$ (ie $x - 0.3x$)

Sale Price $=$ £350, implying that

$0.7x = 350$

multiply both sides by 10

$7x = 3500$

$x = \frac{3500}{7} = 500$

£..........500..........

(Total 3 marks)

6. Work out an estimate for the value of

$$\frac{6.8 \times 191}{0.051} = \frac{7 \times 200}{0.05} \frac{(\times 10)}{(\times 10)} =$$

$$= \frac{14000}{0.5} = \frac{14000}{1/2} = \frac{2 \times 14000}{1}$$

28000
....

(Total 3 marks)

7.

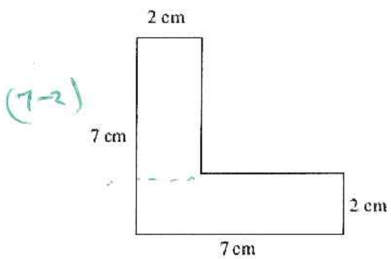


Diagram **NOT** accurately drawn

The diagram shows the cross-section of a solid prism.
The length of the prism is 2 m.

The prism is made from metal.
The density of the metal is 8 grams per cm^3.

Work out the mass of the prism.

$\text{Density} = \frac{\text{mass}}{\text{volume}} \Rightarrow \text{mass} = \text{Density} \times \text{Volume}$

volume of prism = A.h or A.L

$= [(7 \times 2) + 5 \times 2] \cdot 200$ (note: 2m = 200cm)

" " $= 24 \times 200$

" " $= 4800\ cm^3$

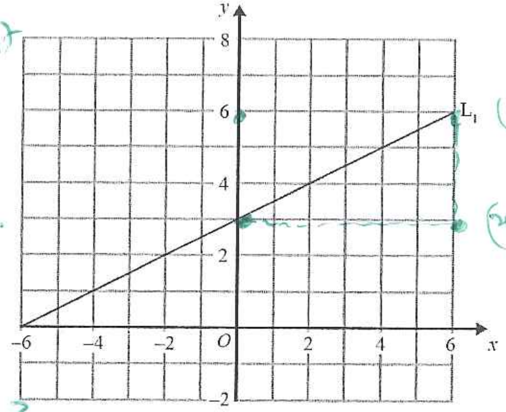
$\text{mass} = \frac{8g}{\cancel{cm^3}} \times 4800\ \cancel{cm^3} = 38400g$

38,400g
....

(Total 5 marks)

8. The diagram shows a straight line, L_1, drawn on a grid.

Equation of straight line
$y = mx + c$
m = gradient
c = y-intercept.



$(x_2, y_2) = (6, 6)$

$(x_1, y_1) = (0, 3)$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Take $y_2 = 6, y_1 = 3$

A straight line, L_2, is parallel to the straight line L_1 and passes through the point (0, –5).

Find an equation of the straight line L_2.

Take $x_2 = 6, x_1 = 0$

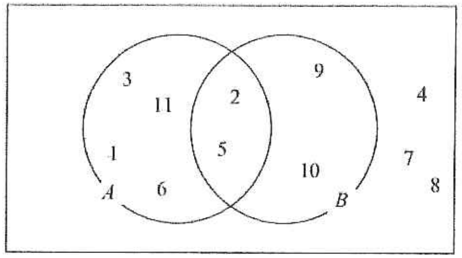
$m = \dfrac{6-3}{6-0} = \dfrac{3}{6} = \dfrac{1}{2}$

Through point $(0, -5)$, y intercept $= -5$
using $y = mx + c$ implies that $\boxed{y = \frac{1}{2}x - 5}$

....

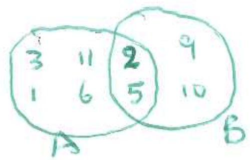
(Total 3 marks)

9. The Venn diagram shows the numbers 1 to 11



(a) Work out P $(A \cup B)$

$A \cup B =$



$n(A \cup B) = 8$

$P(A \cup B) = \dfrac{n(A \cup B)}{\text{Total numbers}} = \dfrac{8}{11}$

....

(2)

(b) Work out P (B')

B' = not in B = 1, 3, 4, 6, 7, 8, 11

$n(B') = 7$

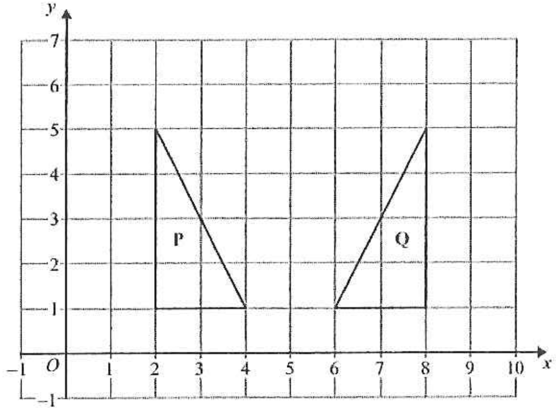
$P(B') = \dfrac{7}{11}$

....

(2)

(Total 4 marks)

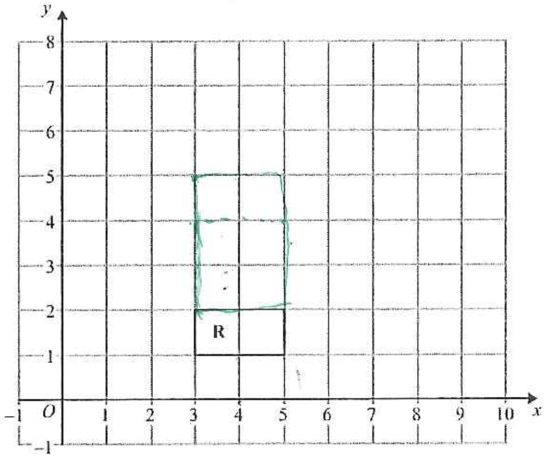
10.

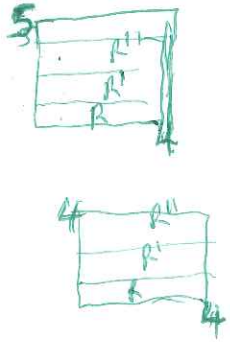


(a) Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

Triangle P has been reflected through line x=5 to give triangle Q.

(2)

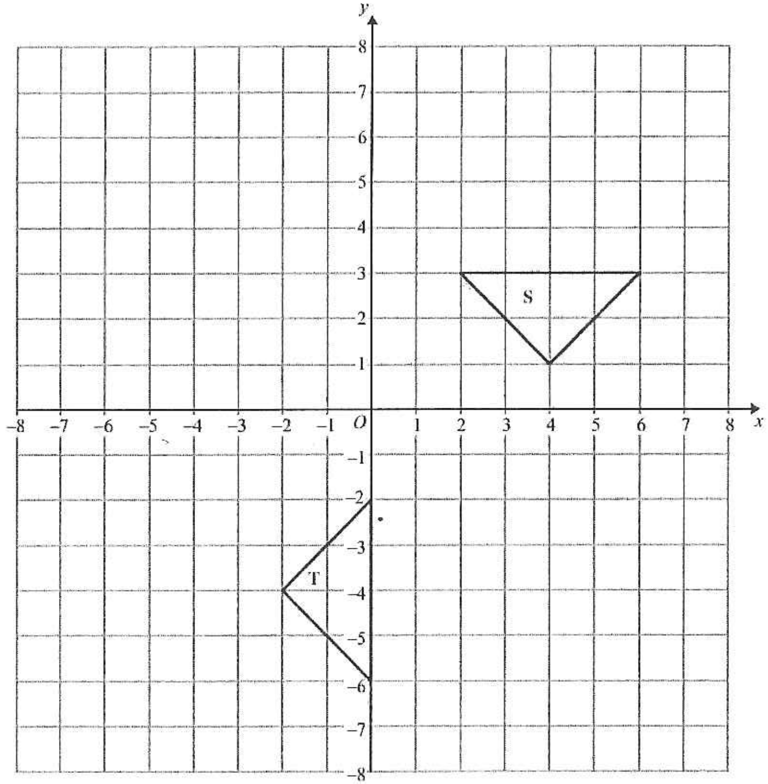




(b) Enlarge rectangle **R**, with scale factor 3 and centre (4, 0).

(2)

Note → The scale factor shows the step size to increase
At centre (4,0), x = 4, y = 0
move upward at centre 4 in 3 steps or boxes.
Hence the coordinates will be (5,4) or (4,4)



Shape **S** can be transformed to shape **T** by the translation $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ followed by a rotation.

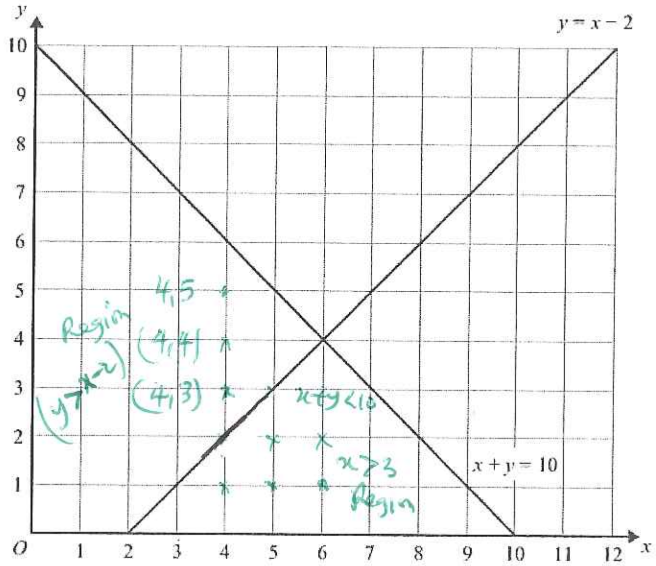
(c) Describe the rotation.

The shape S has been translated by rotation movement 90° clockwise at centre (0,0). The 'x' movement is 0, and 3 steps down in the negative 'y'-direction

(3)

(Total 7 marks)

11. The lines $y = x - 2$ and $x + y = 10$ are drawn on the grid.



On the grid, mark with a cross (×) each of the points with integer coordinates that are in the region defined by

$y > x - 2$

$x + y < 10$

$x > 3$

Note: Some points in the region $x > 3$ and region $x+y < 10$ meets same condition

(Total 3 marks)

$x > 3$ {points $\binom{4}{1}$ and $\binom{5}{1}$, $\binom{6}{1}$, $\binom{7}{1}$}

$x + y < 10$ {$\binom{6}{1}$, $\binom{6}{2}$, $\binom{6}{3}$}

$y > x - 2$ points $\binom{4}{3}$, $\binom{4}{4}$, $\binom{4}{5}$

12. Harry travels from Appleton to Brockley at an average speed of 50 mph.
He then travels from Brockley to Cantham at an average speed of 70 mph.

Harry takes a total time of 5 hours to travel from Appleton to Cantham.
The distance from Brockley to Cantham is 210 miles.

Calculate Harry's average speed for the total distance travelled from Appleton to Cantham.

Recall : Speed = $\frac{\text{dist.}}{\text{time}}$

Journey : A ⟶ B = 50 mph

B ⟶ C = 70 mph, dist. 210 miles

(time = $\frac{210}{70}$ = 3 hrs)

Total time from A to C = 5 hrs

Time from A to B = 5 − 3 = 2 hrs

Total distance from A to B = Speed × time
= 50 × 2 = 100 miles

Total distance from A to C = 210 + 100
= 310 miles

Average speed from A to C = $\frac{310}{5\text{ hrs}}$ = 62 mph

62 .... mph

(Total 4 marks)

13.

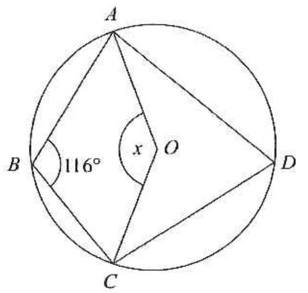


Diagram **NOT** accurately drawn

A, B, C and D are points on the circumference of a circle with centre O.
Angle $ABC = 116°$.

Find the size of the angle marked x.
Give reasons for your answer.

Angle AOC = twice angle ABC

Rules | Reason → Angle at centre is 2X that at any other part of the circumference

$\therefore$ AOC $2 \times 116 = 232°$

$x + 232 = 360°$ (Angle at a point $= 360°$)

$x = 360 - 232 = \underline{128°}$

(Total 4 marks)

14. The nth term of a quadratic sequence is $n^2 + 3n - 2$

(a) Find the fourth term of this sequence.

$n = 4$

$4^2 + 3 \times 4 - 2$

$16 + 12 - 2 = 26$

26

(2)

Here are the first five terms of a different quadratic sequence.

1 7 17 31 49

(b) Find, in terms of n, an expression for the nth term of this sequence.

1 7 17 31 49

1st diff: → 6 10 14 18

2nd diff → 4 4 4

General term is $an^2 + bn + c$

since 2nd difference is constant 4

$a = \frac{4}{2} = 2$

Hence $2n^2 - 1$

....

(3)

(Total 5 marks)

15. Fiza has 10 coins in a bag.
There are three £1 coins and seven 50 pence coins.

Fiza takes at random, 3 coins from the bag.

Work out the probability that she takes exactly £2.50.

Three possible combination to add up to £2.50 are

£1, £1 50p | A
OR 50p, £1, £1 | B
OR £1 50p £1 | C

prob (£1) $= \frac{3}{10}$ and prob (50p) $= \frac{7}{10}$

Note: Every time she takes a coin, it is not replaced.

Hence probability outcome will be =

A + B + C

$\frac{3}{10} \times \frac{2}{9} \times \frac{7}{8} + \frac{7}{10} \times \frac{3}{9} \times \frac{2}{8} + \frac{3}{10} \times \frac{7}{9} \times \frac{2}{8}$

$\frac{42}{720} + \frac{42}{720} + \frac{42}{720} = \frac{126}{720}$

.... $\frac{126}{720}$

(Total 4 marks)

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16. M is directly proportional to L^3.

When $L = 2$, $M = 160$

Find the value of M when $L = 3$

$M \propto L^3$

$M = KL^3$

$K = \frac{M}{L^3} = \frac{160}{2^3} = \frac{160}{8} = 20$

Relationship $\{ M = 20L^3 \}$

When $L=3$, $M = 20 \times 3^3$

$M = 20 \times 27$

$M = 540$

.... 540

(Total 4 marks)

17. Solve $(x-1)^2 - 2(x-1) - 3 = 0$

$(x-1)(x-1) - 2(x-1) - 3 = 0$

$x^2 - x - x + 1 - 2x + 2 - 3 = 0$

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

$x^2 - 4x = 0$

$x(x-4) = 0$

$x = 0$ OR $x - 4 = 0$

$x = 0$ OR 4

....

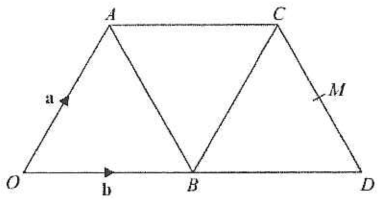
(Total 4 marks)

18. *OACD* is a trapezium made from three equilateral triangles.

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

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

M is the midpoint of *CD*.



(a) Write $\overrightarrow{AB}$ in terms of **a** and **b**.

$\overrightarrow{AB} = \overrightarrow{OB} - OA$

$AB = b - a$

....

(1)

(b) Show that $\overrightarrow{OC}$ is parallel to $\overrightarrow{BM}$.

$\overrightarrow{OA}$ is parallel to $\overrightarrow{BC}$ i.e $\overrightarrow{OA} \parallel \overrightarrow{BC}$

$\overrightarrow{OA} = \overrightarrow{BC} = a$

$OC = \overrightarrow{OB} + \overrightarrow{BC}$

$OC = b + a$ OR $a + b$

$\overrightarrow{AB} \parallel \overrightarrow{CD}$

$AB = CD = b - a$

$CM = \frac{1}{2} CD = \frac{1}{2}(b - a)$

$BM = \overrightarrow{BC} + \overrightarrow{CM}$

$= a + \frac{1}{2}(b - a)$

$BM = \frac{1}{2}(a + b)$

$BM = \frac{1}{2} \overrightarrow{OC}$ (Since $\overrightarrow{OC} = a + b$)

(This shows that BM and OC are parallel.)

(4)

(Total 5 marks)

19. Prove algebraically that the sum of the squares of two consecutive integers is always an odd number.

2 Integers : x, $x+1$

Their Square : x^2 and $(x+1)^2$

Their Sum : $x^2 + (x+1)^2$

Expand this : $x^2 + x^2 + 2x + 1$

: $2x^2 + 2x + 1$

The Components $2x^2$ will always be even

The components $2x$ will also be even

The 1 is odd

Adding even + even + odd = Odd

(Total 3 marks)

20. Given that $\dfrac{8-\sqrt{18}}{\sqrt{2}} = a + b\sqrt{2}$, where a and b are integers,

find the value of a and the value of b.

Rationalize this surd :

$\dfrac{8-\sqrt{18}}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{8\sqrt{2}-\sqrt{2}\times\sqrt{18}}{2} = \dfrac{8\sqrt{2}-\sqrt{2}\times\sqrt{2}\times\sqrt{9}}{2}$

$\dfrac{8\sqrt{2}-2\sqrt{9}}{2} = \dfrac{8\sqrt{2}-2\times 3}{2} = \dfrac{\cancel{2}(4\sqrt{2}-3)}{\cancel{2}}$

$= 4\sqrt{2}-3$

$= -3+4\sqrt{2}$

$a =$ ......-3......

$b =$ ......4......

(Total 3 marks)

TOTAL FOR PAPER IS 80 MARKS