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.

Solutions

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.

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

You must show clearly how you got your answer.

32 8 64 2 16 1

64^0 $8^{\frac{1}{3}}$ $64^{\frac{1}{2}}$ 16 2^5 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	0.14	0.3	0.16

Work out the number of yellow counters in the bag.

0.4
0.3
0.16
0.86

1 − 0.86 = 0.14

50 × 0.14 = 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?

20 40 60 80 100 (120)

24 48 72 96 (120)

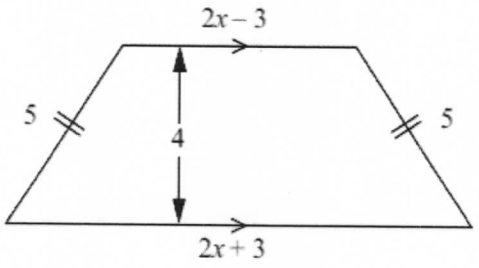
120 min = 2 hours

so 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.

$$\text{Area} = \frac{1}{2}(2x+3+2x-3)\times 4 = 18$$

$$2(4x) = 18$$

$$8x = 18$$

$$x = \frac{18}{8} = \frac{9}{4}$$

$$\text{Perimeter} = 2x-3+5+2x+3+5$$

$$= 4x+10$$

$$\text{Perimeter} = 4\left(\frac{9}{4}\right)+10$$

$$= 9+10$$

$$= 19 \text{ cm}$$

19 .....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

$100 - 30 = 70\%$

Work out the normal price of the television.

£350 = 70% of original price

£50 = 10% of original price

£500 = 100% of original price

£ 500

(Total 3 marks)

6. Work out an estimate for the value of

$$\frac{6.8\times191}{0.051}$$

$\approx \frac{7 \times 200}{0.05}$

$= \frac{1400}{0.05} = \frac{140000}{5}$

$= 28000$

28000

.....

(Total 3 marks)

7.

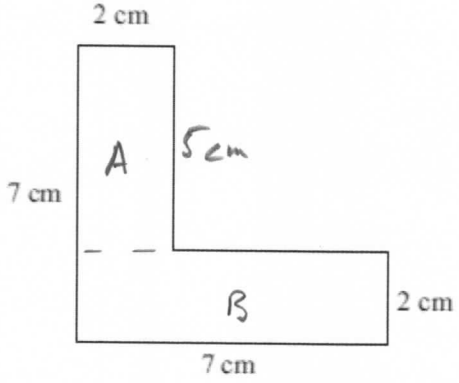


Diagram **NOT** accurately drawn

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.

Area A $5 \times 2 = 10$

Area B $7 \times 2 = 14$

Total Area $24\ cm^2$

Length = 200 cm

Volume = Area × Length

$= 24 \times 200$

$= 4800\ cm^3$

Mass = Volume × Density

$= 4800 \times 8\ g$

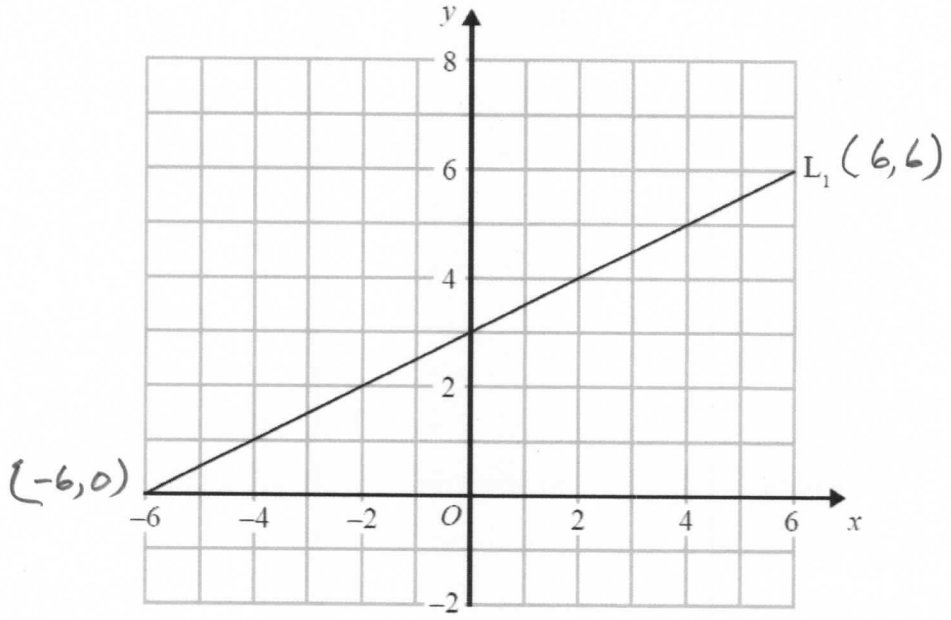
4800×8

38400

38,400 g

(Total 5 marks)

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



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.

Gradient of $L_1 = \frac{6-0}{6--6} = \frac{6}{12} = \frac{1}{2}$

L_2 parallel so gradient $= \frac{1}{2}$

Also through $(0, -5)$

$y - y_1 = m(x - x_1)$

$y - -5 = \frac{1}{2}(x - 0)$

$y + 5 = \frac{1}{2}x$

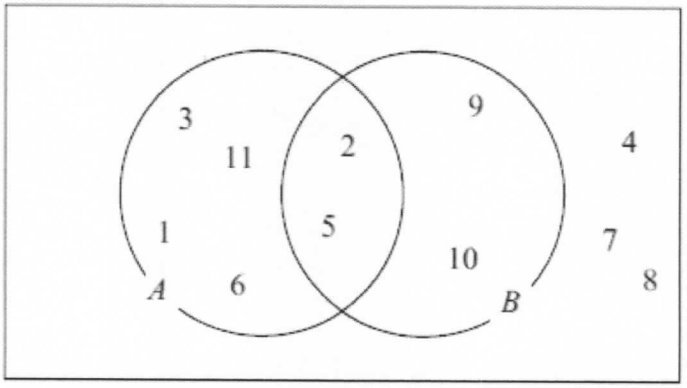
$y = \frac{1}{2}x - 5$

$y = \frac{1}{2}x - 5$

.....

(Total 3 marks)

9. The Venn diagram shows the numbers 1 to 11



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

$\frac{8}{11}$

.....

(2)

(b) Work out P (B')

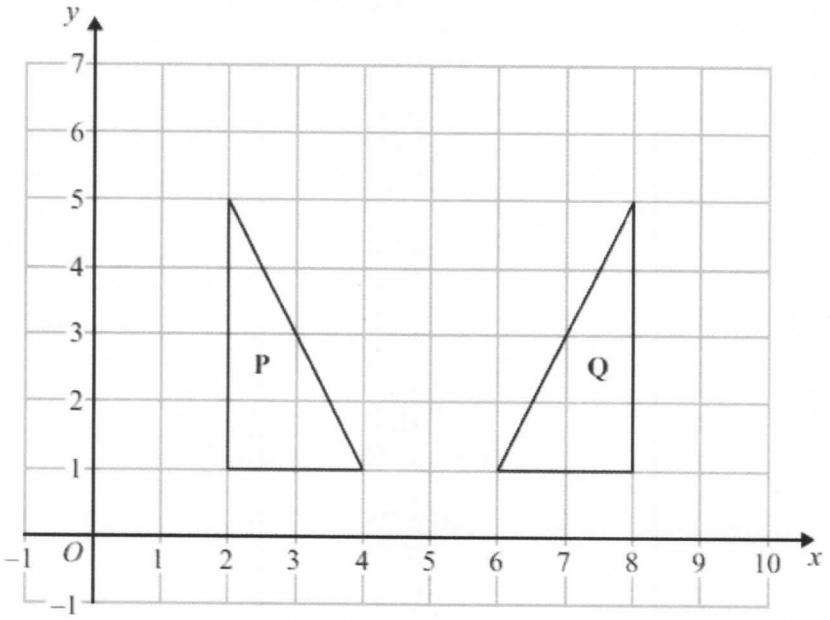
$\frac{7}{11}$

.....

(2)

(Total 4 marks)

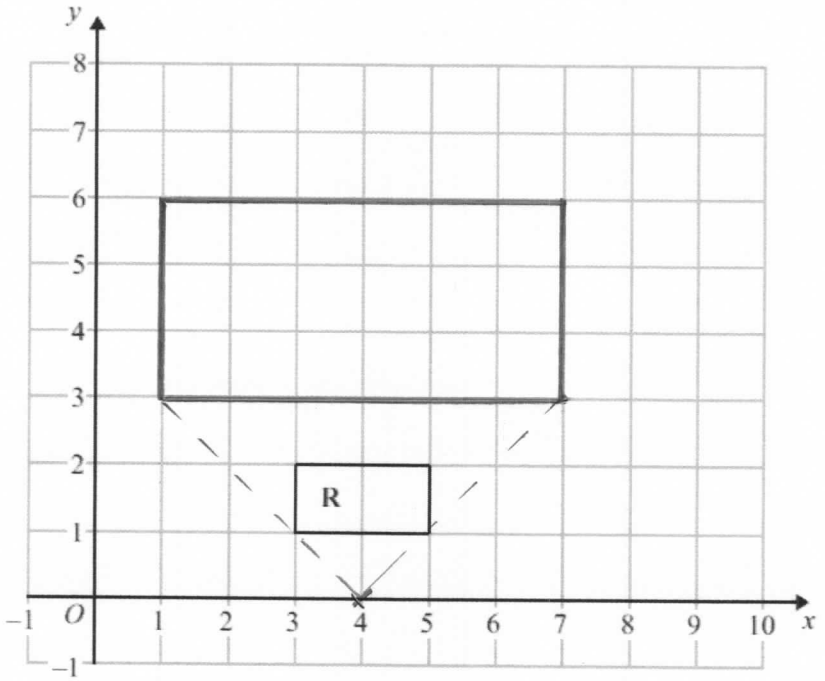
10.



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

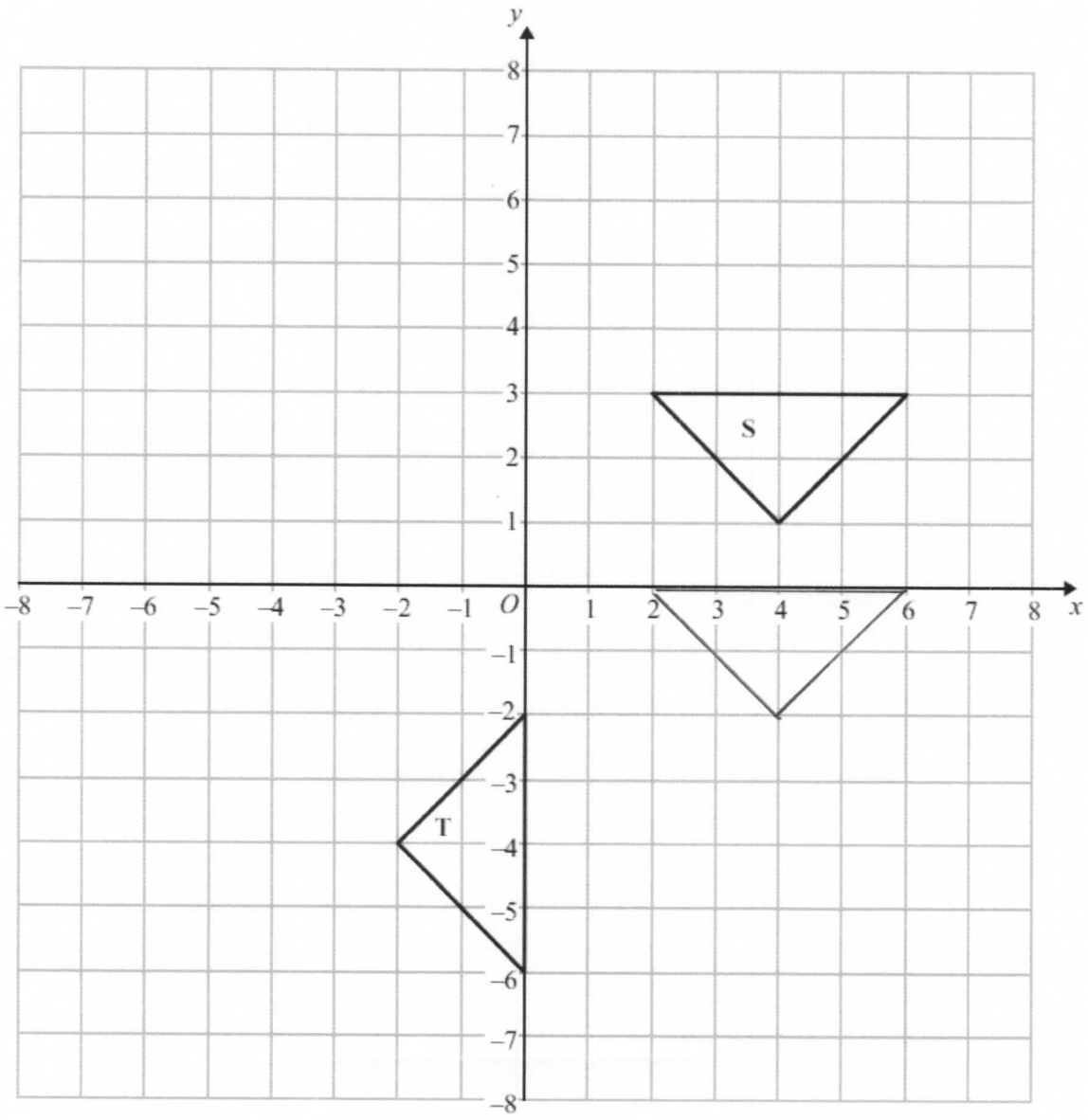
Reflection in line $x = 5$

(2)



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

(2)



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

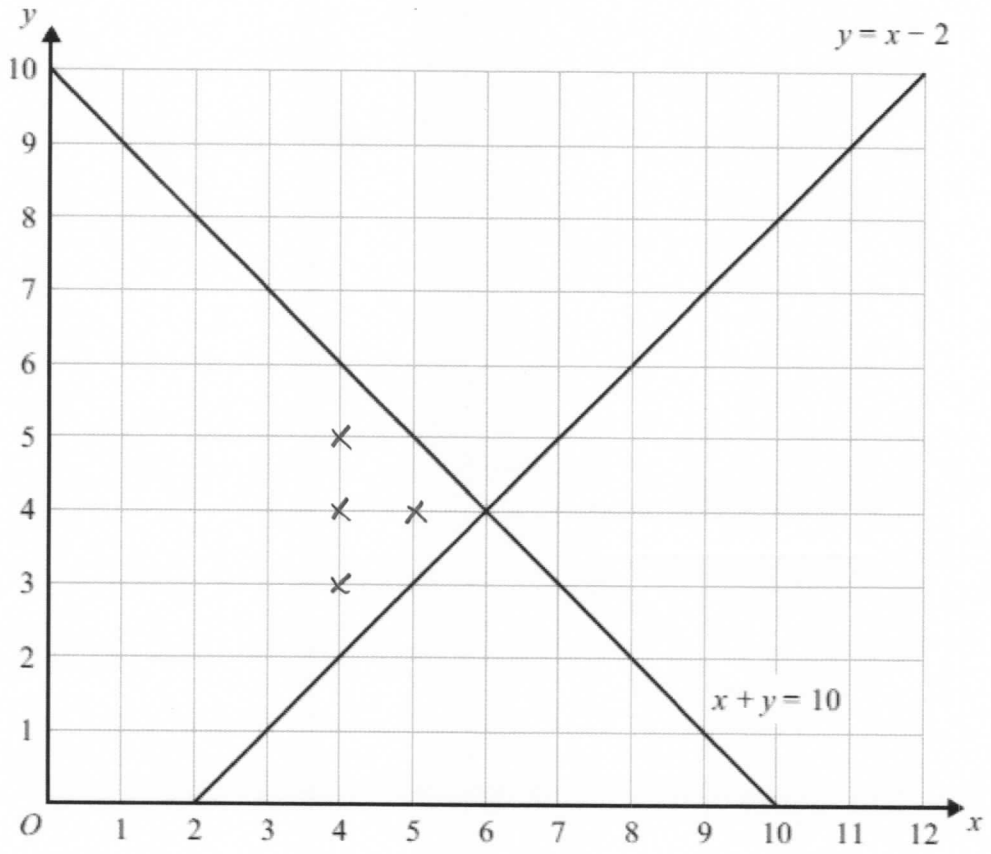
(c) Describe the rotation.

Rotation by 90° clockwise about (0,0)

(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

$$y > x - 2$$

$$x + y < 10$$

$$x > 3$$

(Total 3 marks)

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.

B to C $\quad T = \frac{D}{S} = \frac{210}{70} = 3$ hours

Time for A to B $= 5 - 3 = 2$ hours

A to B $\quad$ Distance $=$ Speed $\times$ Time
$= 50 \times 2$
$= 100$ miles

Total Distance $= 210 + 100 = 310$ miles

Average Speed $= \frac{\text{Total Distance}}{\text{Total Time}} = \frac{310}{5}$

$= 62$ mph

62 mph

(Total 4 marks)

13.

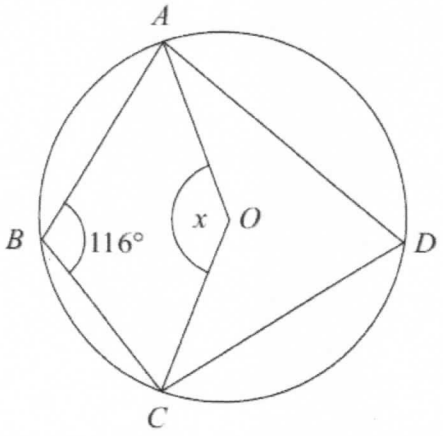


Diagram **NOT** accurately drawn

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.

$\angle ADC = 180 - 116 = 64^\circ$ (opp ∠s of cyclic quad add up to 180°)

$\angle AOC = 2 \times \angle ADC$ (∠ at centre twice ∠ at circumference)

$x = 2 \times 64$

$x = 128^\circ$

(Total 4 marks)

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

(a) Find the fourth term of this sequence.

$4^2 + 3(4) - 2$

$= 16 + 12 - 2$

$= 26$

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.

1st diff	6	10	14	18
2nd diff	4	4	4	

	1	7	17	31	49
$2n^2$	2	8	18	32	50
-1	-1	-1	-1	-1	-1

n^{th} term $= 2n^2 - 1$

.....

(3)

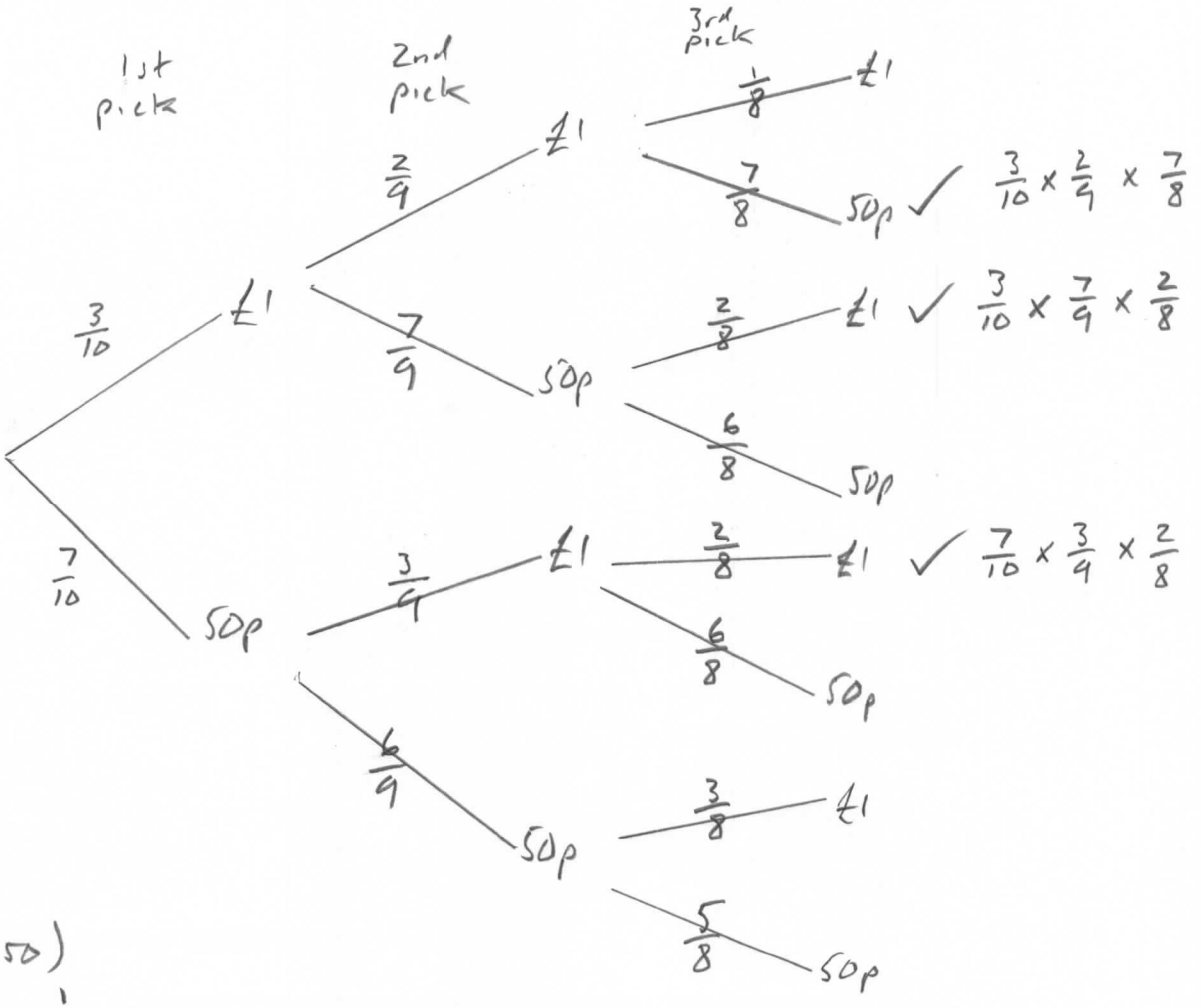
(Total 5 marks)

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.

Requires 2 £1 coins
and 1 50 pence coin



P(£2.50)

$= \frac{3^{1} \times \cancel{3}^{1} \times \cancel{2}^{1} \times 7}{10 \times \cancel{9}^{1} \times \cancel{8}_{4}} = \frac{7}{40}$

$\frac{7}{40}$

.....

(Total 4 marks)

16. M is directly proportional to L^3.

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

Find the value of M when $L = 3$

$M = kL^3$

$160 = k \times 2^3$

$160 = 8k$

$\frac{160}{8} = k$

$20 = k$

$M = 20L^3$

when $L = 3$

$M = 20 \times 3^3$

$= 20 \times 27$

$= 540$

540

(Total 4 marks)

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

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

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

$x^2 - 4x = 0$

$x(x-4) = 0$

$\Rightarrow \underline{x = 0}$ or $x - 4 = 0$

$\underline{x = 4}$

$x = 0$, $x = 4$

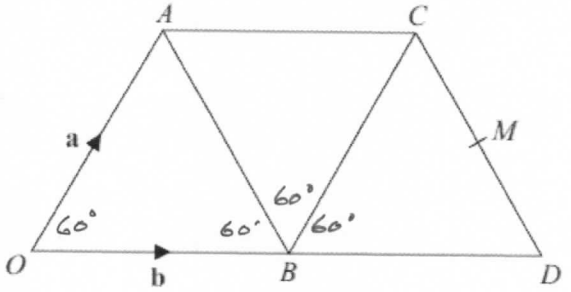
(Total 4 marks)

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**.

$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= -\underline{a} + \underline{b}$

$\overrightarrow{AB} = -\underline{a} + \underline{b}$

(1)

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

Because Δs are equilateral

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

$\overrightarrow{BD} = \underline{b}$

$\overrightarrow{CD} = -\underline{a} + \underline{b}$

$\overrightarrow{AC} = \underline{b}$

$\overrightarrow{OC} = \overrightarrow{OA} + \overrightarrow{AC}$

$= \underline{a} + \underline{b}$

$\overrightarrow{BM} = \overrightarrow{BC} + \frac{1}{2}\overrightarrow{CD}$

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

$= \frac{1}{2}\underline{a} + \frac{1}{2}\underline{b}$

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

$= \frac{1}{2}(\overrightarrow{OC})$

$\therefore$ $\overrightarrow{BM}$ and $\overrightarrow{OC}$ are parallel

(4)

(Total 5 marks)

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

Let numbers be n and $n+1$ where n is an integer

$$n^2 + (n+1)^2$$
$$= n^2 + (n+1)(n+1)$$
$$= n^2 + n^2 + 2n + 1$$
$$= 2n^2 + 2n + 1$$
$$= 2(n^2+n) + 1$$ which is an odd integer

Note n^2+n is an integer

(Total 3 marks)

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

find the value of a and the value of b.

$$\frac{8-\sqrt{18}}{\sqrt{2}} = \frac{8-\sqrt{9\times 2}}{\sqrt{2}} = \frac{8-3\sqrt{2}}{\sqrt{2}}$$

$$\frac{8-3\sqrt{2}}{\sqrt{2}} = \frac{8-3\sqrt{2}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$= \frac{8\sqrt{2}-6}{2}$$

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

$a =$ -3

$b =$ 4

(Total 3 marks)

TOTAL FOR PAPER IS 80 MARKS