

GCSE Mathematics

Practice Tests: Set 1

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.

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 must 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
- 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.

Practice Tests: Set 1 Regular (1H) – Version 1.0

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Decimal Multiplication

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Work out 5.4×0.24

$$\begin{array}{r}
 \downarrow \quad \downarrow \\
 \times 10 \quad \times 100 \quad (\times 1000) \\
 54 \times 24 \\
 \begin{array}{r}
 54 \\
 24 \times \\
 \hline
 216 \\
 1080 \\
 \hline
 1296
 \end{array} \\
 \begin{array}{c}
 \nearrow \quad \nearrow \quad \nearrow \quad \nearrow \\
 1.296
 \end{array}
 \end{array}$$

$(\div 1000) = 1.296$

(Total 3 marks)

2. The height, H cm, of a table is measured as 72 cm correct to the nearest centimetre.

Complete the following statement to show the range of possible values of H .

Error Intervals

$$\begin{array}{r}
 +0.5 \\
 72 \overline{) 72.5} \text{ max} \\
 -0.5 \\
 \hline
 71.5 \text{ min}
 \end{array}$$

$1 \div 2 = 0.5$

$$71.5 \leq H < 72.5$$

(Total 2 marks)

Volume of Fluids (cuboids application)

3. Jane has a carton of orange juice.
The carton is in the shape of a cuboid.

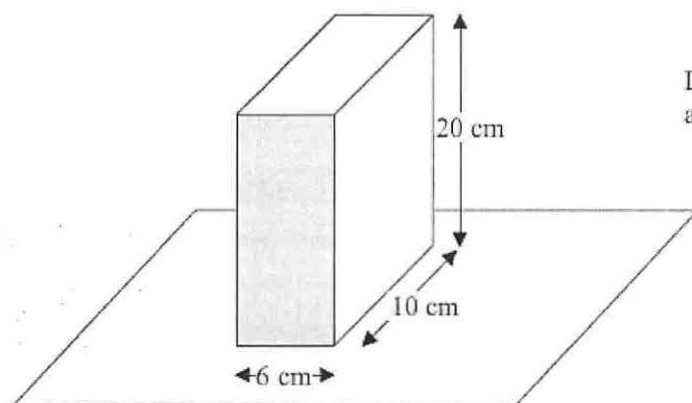


Diagram NOT
accurately drawn

The depth of the orange juice in the carton is 8 cm.

Jane closes the carton.

Then she turns the carton over so that it stands on the shaded face.

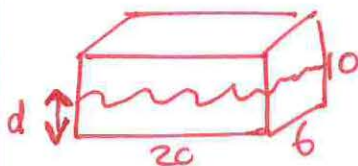
Work out the depth, in cm, of the orange juice now.

volume of juice

$$6\text{ cm} \times 10\text{ cm} \times 8\text{ cm}$$

$$= 480\text{ cm}^3$$

New shape:



Juice has the same
volume as before
($= 480\text{ cm}^3$)
($\div 120\text{ cm}^2$)

$$480\text{ cm}^3 = 20_{\text{cm}} \times 6_{\text{cm}} \times d_{\text{cm}}$$

$$480\text{ cm}^3 = 120\text{ cm}^2 \times d_{\text{cm}}$$

$$4\text{ cm} = d$$

4

(Total 3 marks)

4. Write the following numbers in order of size.
Start with the smallest number.

$$0.038 \times 10^2$$

$$\downarrow$$

$$3.8$$

$$3800 \times 10^{-4}$$

$$\downarrow$$

$$0.38$$

$$380$$

$$\downarrow$$

$$380$$

$$0.38 \times 10^{-1}$$

$$\downarrow$$

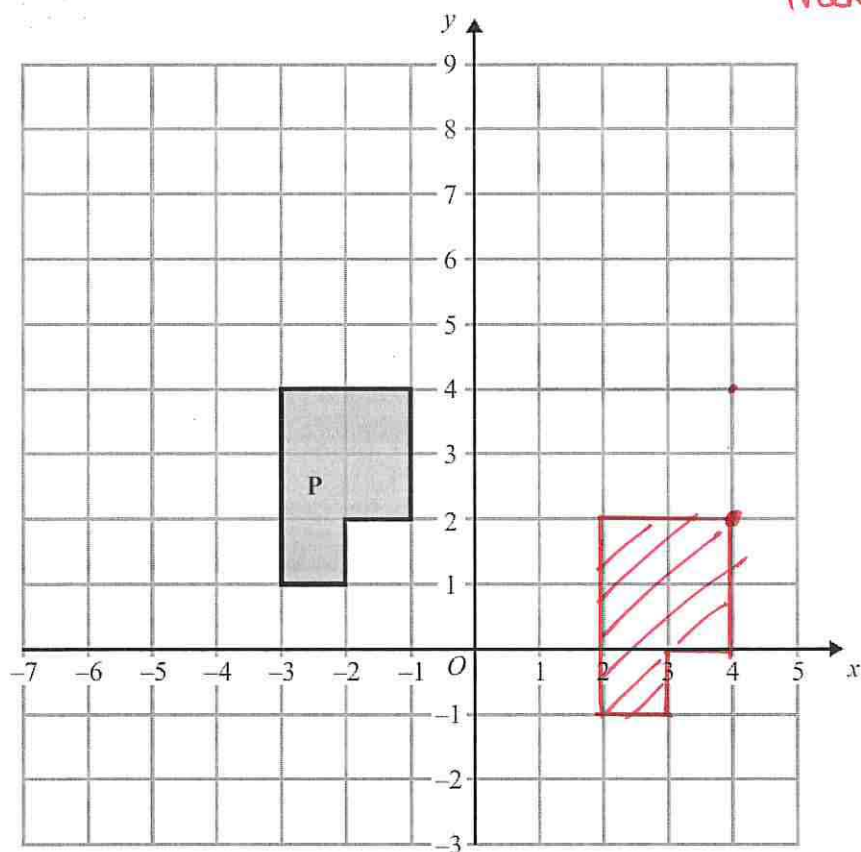
$$0.038$$

0.038, 0.38, 3.8, 380

(Total 2 marks)

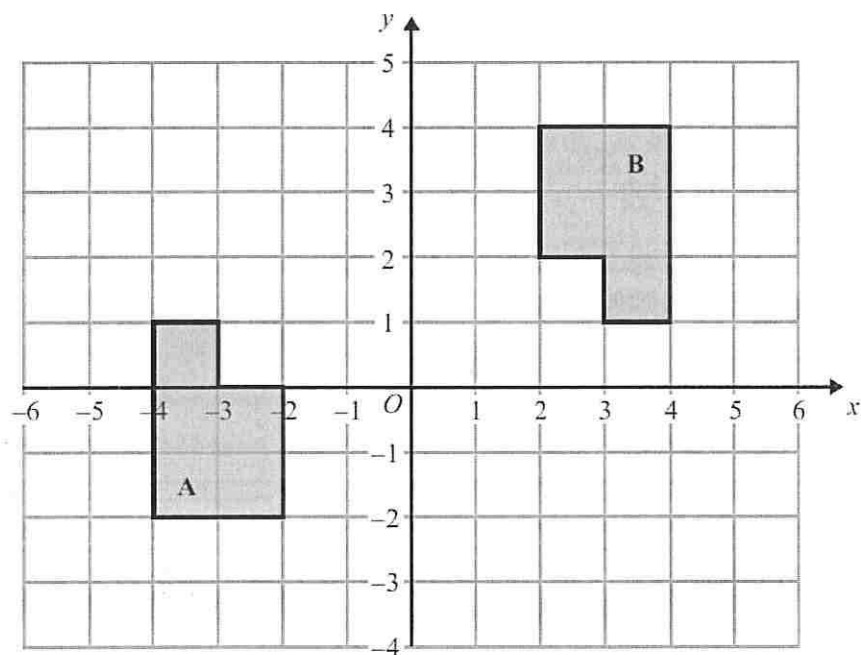
- 5.

Transformations



- (a) Translate shape P by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$. *5 right
2 down*

(2)



(b) Describe fully the single transformation that maps shape A onto shape B.

Rotation 180° centre (0,1)

(3)

(Total 5 marks)

6. (a) Simplify

$$\frac{(x+2)^2}{x+2}$$

Simplifying Algebraic Expressions

$$\frac{y^2}{y} = y$$

$$\frac{(x+2)^2}{x+2} = x+2$$

$$\frac{x+2}{1}$$

(1)

(b) Simplify

$$2a^2b \times 3a^3b$$

$$= 2 \times a \times a \times b \times 3 \times a \times a \times a \times b$$

$$= 6a^5b^2$$

(2)

(Total 3 marks)

Sharing Ratio

7. Talil is going to make some concrete mix.
He needs to mix cement, sand and gravel in the ratio 1 : 3 : 5 by weight.

Talil wants to make 180 kg of concrete mix.

Talil has

15 kg of cement

85 kg of sand

100 kg of gravel

Does Talil have enough cement, sand and gravel to make the concrete mix?

Total parts
(÷20)

1 : 3 : 5
(×20)

$1+3+5 = 9 \text{ parts} = 180\text{kg}$

1 part = 20kg

C : S : G
20 : 60 : 100

NEEDS

20 : 60 : 100

HAS

15 : 85 : 100

Conclusion

He doesn't have enough cement, no.

(Total 4 marks)

Ratio and Proportion

8. Suha has a full 600 ml bottle of wallpaper remover.
She is going to mix some of the wallpaper remover with water.

Here is the information on the label of the bottle.

Wallpaper remover
600 ml
Mix $\frac{1}{4}$ of the wallpaper remover
with 4500 ml of water

Suha is going to use 750 ml of water.

How many millilitres of wallpaper remover should Suha use?
You must show your working.

Mixture Ratio	$\frac{1}{4}$ of 600ml = 150ml	
	Remover : Water	
	150ml : 4500ml	
($\div 10$)	15ml : 450ml	
($\div 3$)	5ml : 150ml	
($\times 5$)	<u>25ml</u> : <u>750ml</u>	
	(25ml) 750.....ml	$\begin{array}{r} 150 \\ 5 \times \\ \hline 750 \\ 2 \end{array}$

(Total 4 marks)

9. Sasha carried out a survey of 60 students. She asked them how many CDs they each have.

Averages From Grouped Frequency

This table shows information about the numbers of CDs these students have.

Number of CDs	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24
Frequency	8	11	9	14	18

- C. f. 8 19 28 42 60
(a) Write down the class interval containing the median.

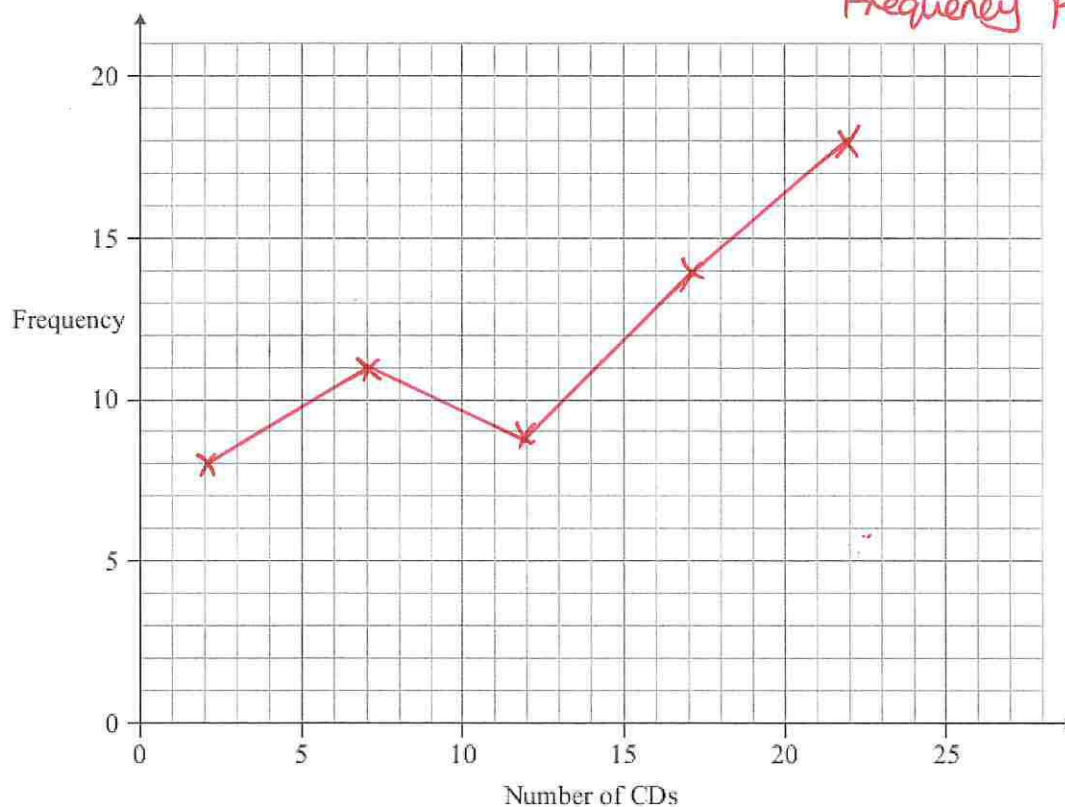
$$\text{median} = \frac{n}{2} = 30^{\text{th}} \text{ student}$$

15-19

\Rightarrow students 29-42 are in 15-19 class \therefore 15-19 (1)

- (b) On the grid, draw a frequency polygon to show the information given in the table.

Frequency Polygon



midpoints!

(2)

(Total 3 marks)

Rearranging Formula

10. Make q the subject of the formula $5(q + p) = 4 + 8p$
Give your answer in its simplest form.

expand	$5(q + p) = 4 + 8p$
$(-5p)$	$5q + 5p = 4 + 8p$
$(\div 5)$	$5q = 4 + 3p$
	$q = \frac{4 + 3p}{5}$

$$q = \frac{4 + 3p}{5}$$

(Total 3 marks)

Expanding and Solving Quadratics

11. (a) Expand and simplify $(x-3)(x+5)$

$$\begin{array}{l|l} \text{expand} & x^2 + 5x - 3x + 15 \\ \text{collect} & \underline{x^2 + 2x - 15} \end{array}$$

$$\underline{x^2 + 2x - 15}$$

(2)

- (b) Solve $x^2 + 8x - 9 = 0$

$$\begin{array}{l|l} \text{factorise} & (x+9)(x-1) = 0 \\ \text{solve} & x+9=0 \text{ or } x-1=0 \end{array}$$

$$(-9) \quad \underline{x = -9} \quad (+1) \quad \underline{x = 1}$$

$$\underline{x = -9 \text{ or } 1}$$

(3)

(Total 5 marks)

12. (a) Solve the inequality

$$3t + 1 < t + 12$$

$$\begin{array}{l|l} (-t) & 2t + 1 < 12 \\ (-1) & 2t < 11 \\ (\div 2) & t < 11/2 \end{array}$$

$$\underline{11/2}$$

(2)

- (b) t is a whole number.

Write down the largest value of t that satisfies

$$3t + 1 < t + 12$$

$$\begin{array}{l|l} \text{from (a)} & t < 11/2 \\ & t < 5.5 \end{array}$$

$$t \text{ is a whole number} \therefore t = 5 \text{ (largest)}$$

$$\underline{5}$$

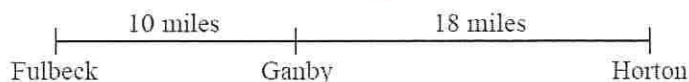
(1)

(Total 3 marks)

Speed Distance Time



13. The distance from Fulbeck to Ganby is 10 miles.
The distance from Ganby to Horton is 18 miles.



Raksha is going to drive from Fulbeck to Ganby.
Then she will drive from Ganby to Horton.

Raksha leaves Fulbeck at 10 00.
She drives from Fulbeck to Ganby at an average speed of 40mph.

Raksha wants to get to Horton at 10 35.

Work out the average speed Raksha must drive at from Ganby to Horton.

Journey 1

$$\begin{aligned} S &= 40 \text{ mph} \\ D &= 10 \text{ miles} \\ T &= ? \text{ ①} = 15 \text{ minutes} \end{aligned}$$

Journey 2

$$\begin{aligned} S &= ? \text{ ③} \\ D &= 18 \text{ miles} \\ T &= 20 \text{ minutes ②} \end{aligned}$$

$$\text{① } T = \frac{D}{S}$$

$$T = \frac{10 \text{ miles}}{40 \text{ mph}}$$

$$= \frac{1}{4} \text{ hours}$$

$$= 15 \text{ minutes}$$

$$\text{② } T = 35 \text{ mins} - 15 \text{ mins} = 20 \text{ minutes}$$

$$\text{③ } S = \frac{D}{T}$$

$$S = \frac{18 \text{ miles}}{20 \text{ minutes}} = \underline{\underline{54 \text{ mph}}}$$

$$\dots\dots\dots 54 \dots\dots\dots \text{mph}$$

(Total 3 marks)

Direct Proportion

14. M is directly proportional to L^3 .

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

Find the value of M when $L = 3$

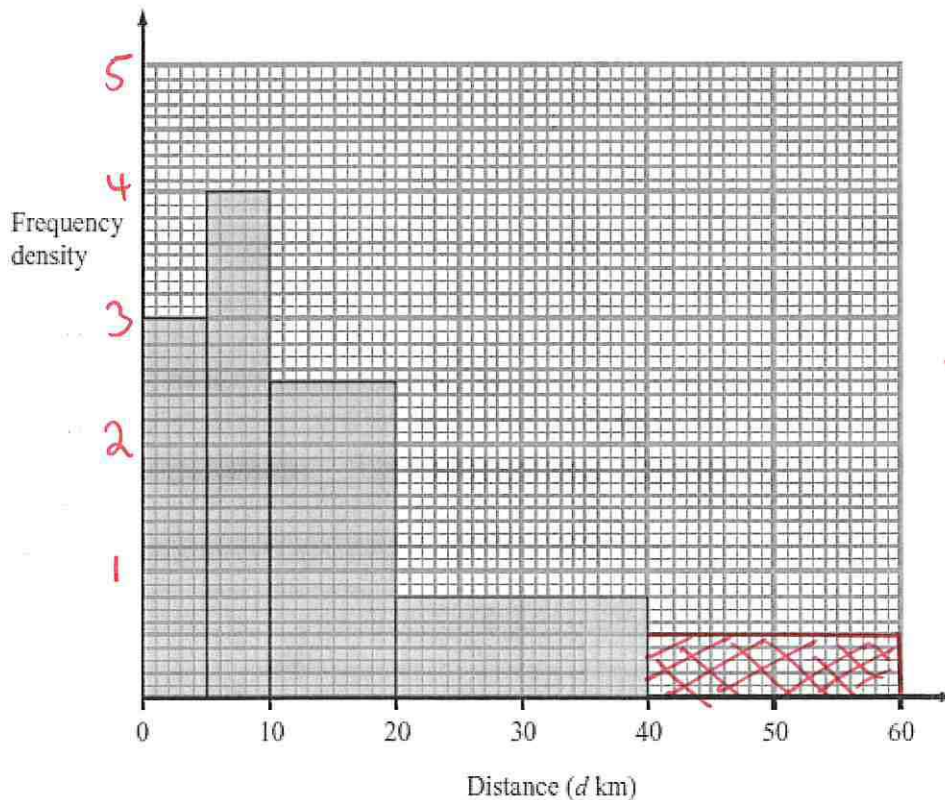
<p>Direct Proportion</p> <p>$L = 2, M = 160$</p> <p>$(\div 8)$</p>	<p>$M \propto L^3$</p> <p>$M = KL^3$</p> <p>$160 = K(2)^3$</p> <p>$160 = 8K$</p> <p>$20 = K$</p>	<p>\rightarrow</p> <p>$K = 20$</p> <p>$L = 3$</p>	<p>$M = KL^3$</p> <p>$M = 20L^3$</p> <p>$M = 20(3)^3$</p> <p>$M = 20 \times 27$</p> <p>$M = 540$</p>
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540

(Total 4 marks)

Histograms

15. The incomplete histogram and table give some information about the distances some teachers travel to school.



$$f = f.d \times c.w$$

$$\frac{f}{c.w} = f.d$$

- (a) Use the information in the histogram to complete the frequency table.

Distance (d km)	Frequency
$0 < d \leq 5$	15
$5 < d \leq 10$	20
$10 < d \leq 20$	25
$20 < d \leq 40$	16
$40 < d \leq 60$	10

$f.d$

3

4

2.5

0.8

0.5

use these to fill in the graph

$$10 \times 2.5 = 25$$

$$20 \times 0.8 = 16$$

(2)

- (b) Use the information in the table to complete the histogram.

(1)

(Total 3 marks)

Index Laws

16. (a) Write down the value of $49^{\frac{1}{2}}$

$$a^{\frac{1}{n}} = \sqrt[n]{a} \quad | \quad 49^{\frac{1}{2}} = \sqrt{49} = 7$$

7
(1)

- (b) Write $\sqrt{45}$ in the form $k\sqrt{5}$, where k is an integer. *Surds*

$$\sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5}$$

$3\sqrt{5}$
(1)

(Total 2 marks)

17. $x = 0.0\overline{45}$

Prove algebraically that x can be written as $\frac{1}{22}$

Recurring Decimals

$$\text{let } x = 0.0\overline{45}4545\dots$$

$$10x = 0.\underline{4}54545\dots$$

$$100x = 4.\underline{5}45454\dots$$

$$1000x = 45.\underline{4}54545\dots$$

$$1000x - 10x = \begin{array}{r} 45.454545\dots \\ - 0.454545\dots \\ \hline \end{array} \quad \text{---} \quad \text{---}$$

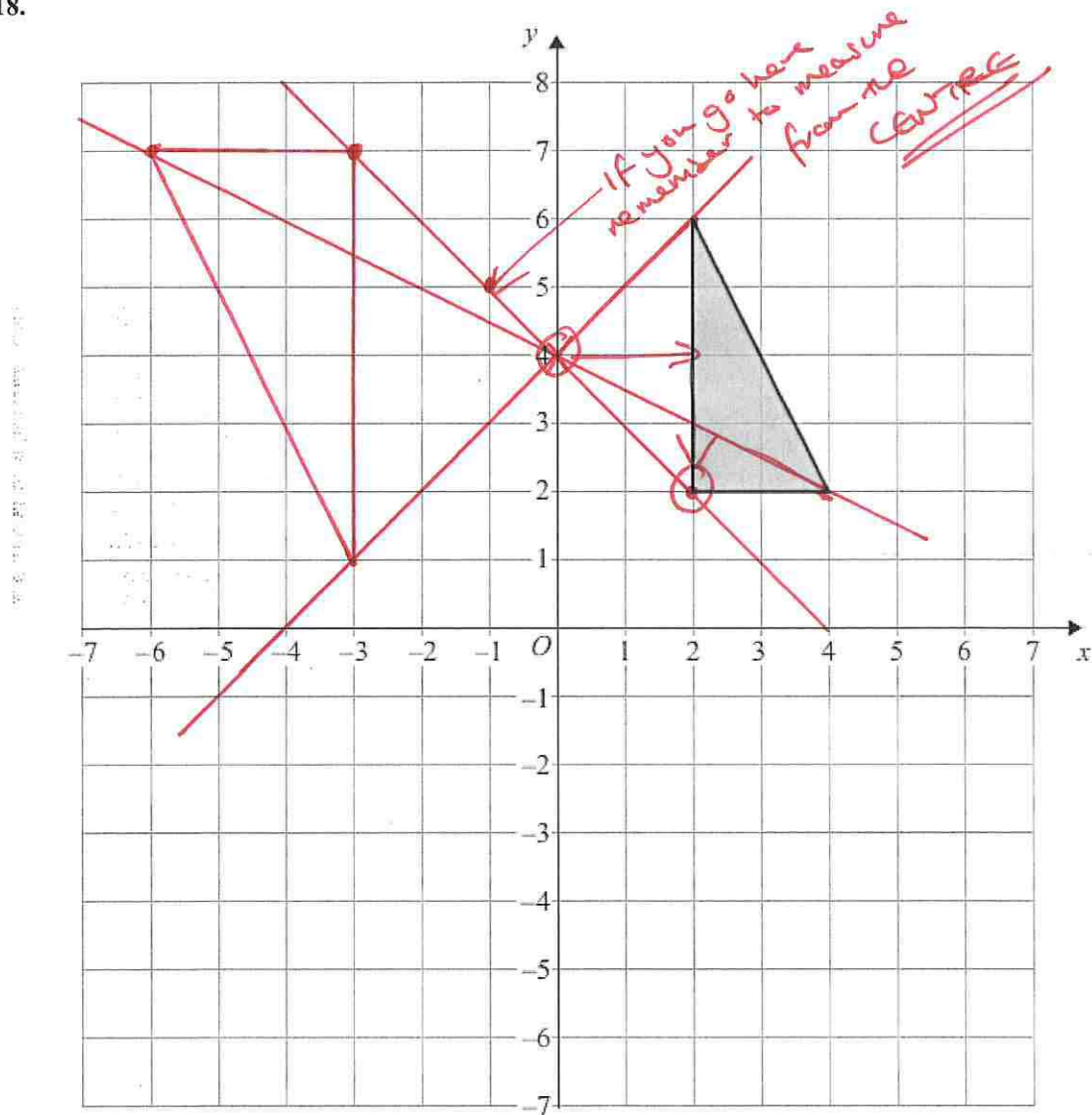
$$990x = 45$$

$$\text{Simplify.} \quad \left(\div 990 \right) \quad x = \frac{45}{990} = \frac{15}{330} = \frac{5}{110} = \underline{\underline{\frac{1}{22}}} \quad \square$$

(Total 3 marks)

By vectors $\begin{pmatrix} 2 \\ -2 \end{pmatrix}$ SF $-\frac{1}{2}$ $-\frac{1}{2} \begin{pmatrix} 2 \\ -2 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$ Negative Enlargements

18.



Enlarge the shaded shape by a scale factor of $-\frac{1}{2}$, centre $(0, 4)$.

(Total 3 marks)

Probability Trees

19. There are three different types of sandwiches on a shelf.

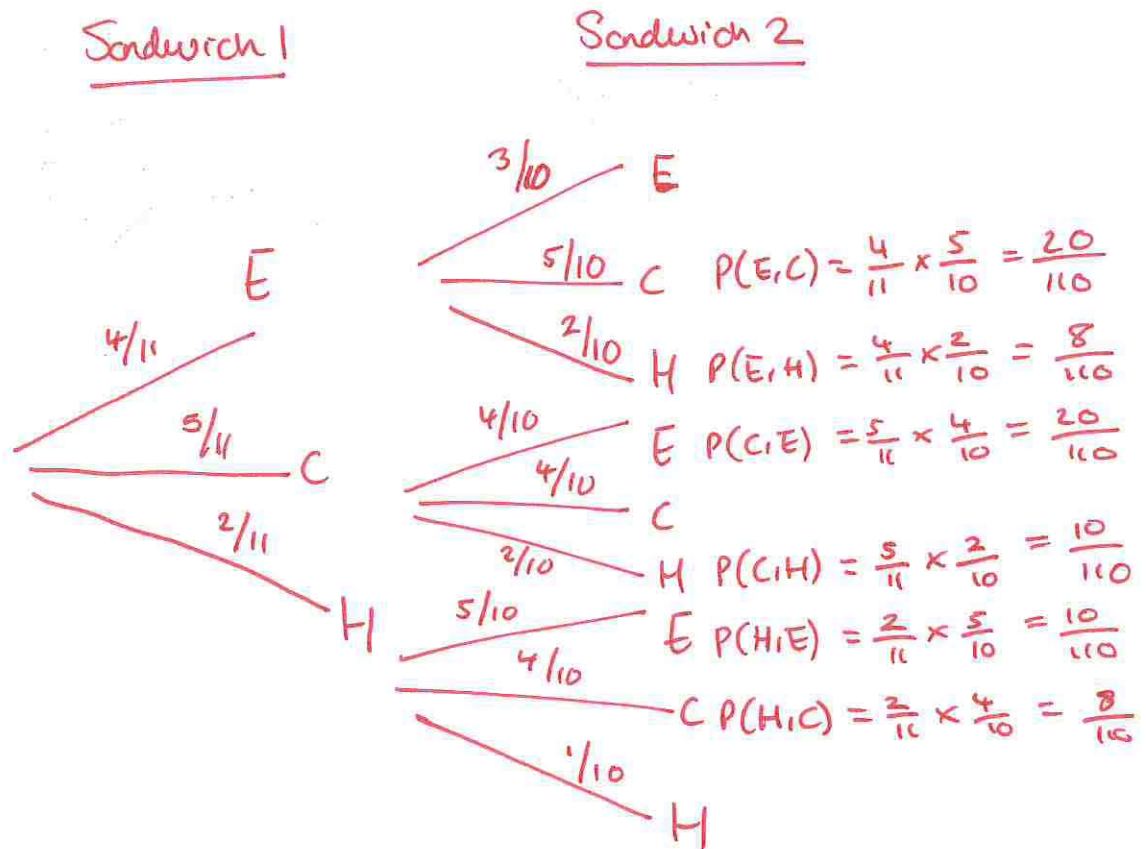
There are

4 egg sandwiches,
5 cheese sandwiches
and 2 ham sandwiches.

Eat means not replaced!

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.



$$P(\text{Two different types}) = P(E,C) + P(E,H) + P(C,E) + P(C,H) + P(H,E) + P(H,C)$$

$$= \frac{20 + 8 + 20 + 10 + 10 + 8}{110} = \frac{76}{110}$$

(Total 5 marks)

Perpendicular Lines

20.

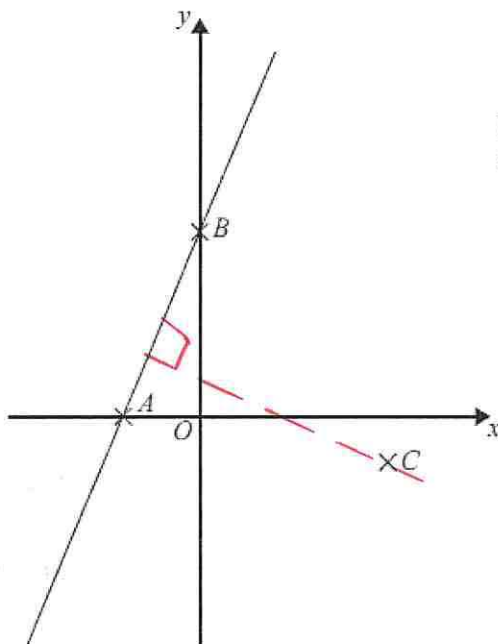


Diagram NOT
accurately drawn

In the diagram

A is the point $(-2, 0)$

B is the point $(0, 4)$

C is the point $(5, -1)$

Find an equation of the line that passes through C and is perpendicular to AB.

Gradient of AB

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

Gradient of BC

$$m_1 \times m_2 = -1$$

$$y = -\frac{1}{2}x + c$$

at $(5, -1)$

$$\left(+\frac{5}{2}\right)$$

$$y = mx + c \text{ form}$$

$$m = \frac{4 - 0}{0 - (-2)} = \frac{4}{2} = 2$$

$$\therefore \text{gradient of BC} = -\frac{1}{2}$$

$$-1 = -\frac{1}{2}(5) + c$$

$$-1 = -\frac{5}{2} + c$$

$$\frac{3}{2} = c$$

$$y = -\frac{1}{2}x + \frac{3}{2}$$

$$y = -\frac{1}{2}x + \frac{3}{2}$$

(Total 4 marks)

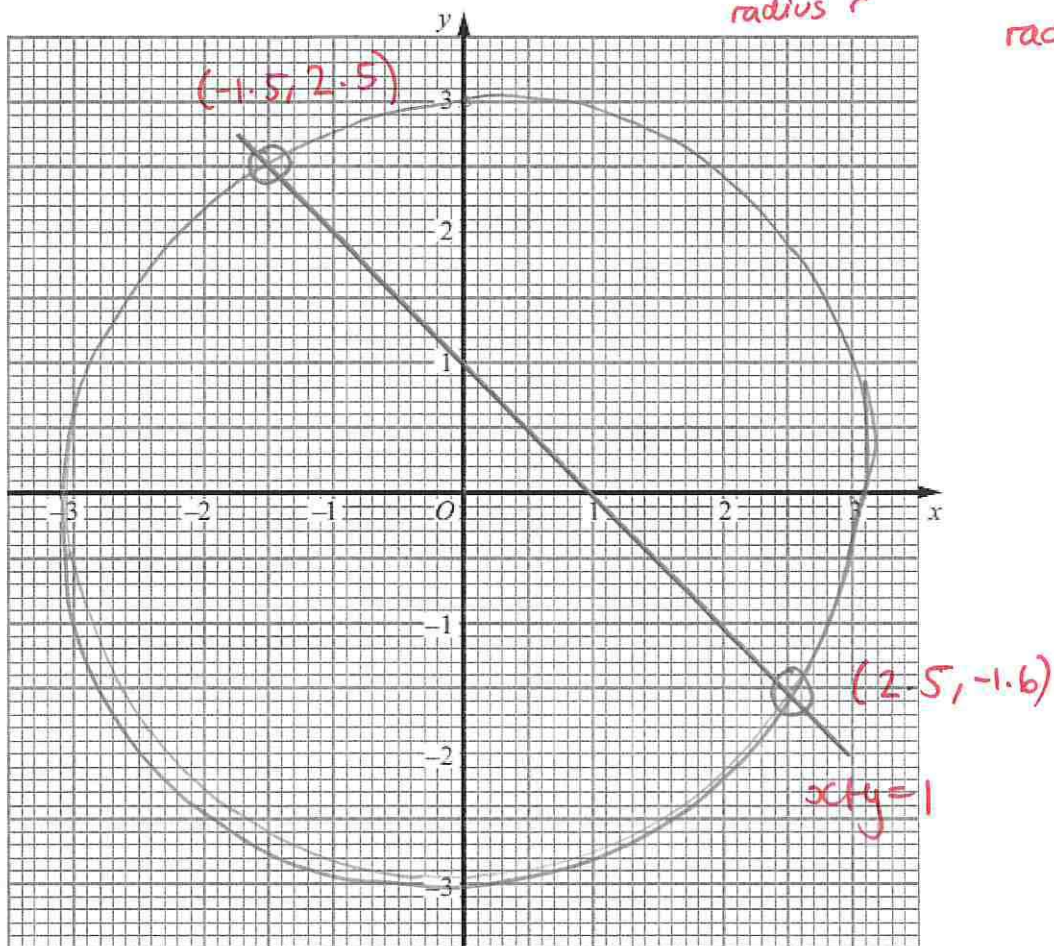
Equation of Circles

$$(x-a)^2 + (y-b)^2 = r^2$$

centre (a, b)
radius r

\therefore centre = $(0, 0)$
radius = 3.

21. (a) Construct the graph of $x^2 + y^2 = 9$



(2)

- (b) By drawing the line $x + y = 1$ on the grid, solve the equations $x^2 + y^2 = 9$ centre $(0, 0)$ radius = 3
 $x + y = 1$

Graphical Simultaneous Equations

\Rightarrow points of
intersection

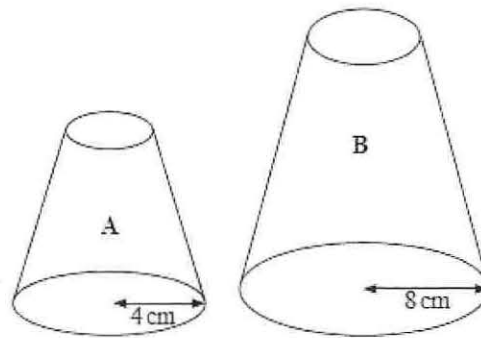
$$x = 2.5, y = -1.6$$

$$\text{or } x = -1.5, y = 2.5$$

(3)

(Total 5 marks)

22.



Two solid shapes, **A** and **B**, are mathematically similar.

The base of shape **A** is a circle with radius 4 cm.

The base of shape **B** is a circle with radius 8 cm.

The surface area of shape **A** is 80 cm^2 .

(a) Work out the surface area of shape **B**.

$$\begin{array}{l|l}
 \text{LSF} & 4 : 8 \\
 \text{A : B} & 1 : 2 \\
 (\div 4) & \\
 \hline
 \text{ASF} = (\text{LSF})^2 = & 1 : 4 \\
 (\times 80) & 80 : 320
 \end{array}$$

$$\begin{array}{r}
 320 \\
 \hline
 \text{cm}^2 \\
 (2)
 \end{array}$$

The volume of shape **B** is 600 cm^3 .

(b) Work out the volume of shape **A**.

$$\begin{array}{l|l}
 \text{VSF} = (\text{LSF})^3 & 1 : 2 \\
 = (\text{ANS}^3) & 1 : 8 \\
 \times 75 \downarrow & 75 : 600 \uparrow \div 75
 \end{array}$$

$$\begin{array}{r}
 75 \\
 8 \overline{) 600}
 \end{array}$$

$$\begin{array}{r}
 75 \\
 \hline
 \text{cm}^3 \\
 (2)
 \end{array}$$

(Total 4 marks)

23.

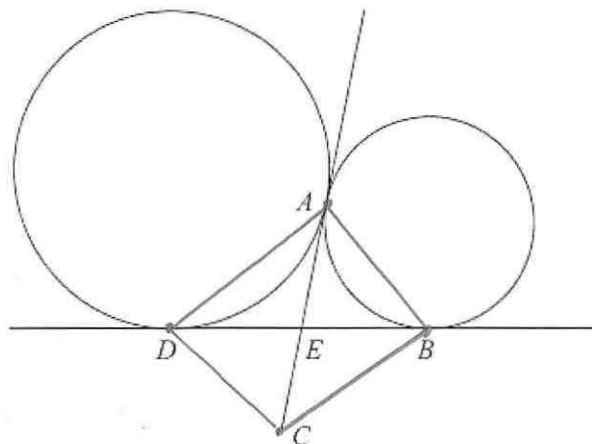


Diagram NOT accurately drawn.

A and D are two points on the circumference of a circle.
 A and B are two points on the circumference of a smaller circle.
 DB and AC are tangents to both circles.
 E is the intersection of DB and AC .
 E is the midpoint of AC .

Prove that $ABCD$ is a rectangle.

$$BE = AE$$

BE and AE are tangents of the smaller circle
 (circle theorem)

$$DE = AE$$

DE and AE are tangents of the larger circle
 (circle theorem)

$$\therefore BE = DE$$

$$AE = \cancel{CE}$$

E is the midpoint of AC

$$\therefore AE = BE = CE = DE$$

$$\therefore AC = BD$$

Diagonals intersect and they are equal

\therefore Rectangle
 $ABCD$



(Total 4 marks)

TOTAL FOR PAPER IS 80 MARKS