HIGHER PRE-SEEN PAPER THURS 17th + FRI 18th JAN

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.

This publication may only be reproduced in accordance with Pearson Education Limited copyright policy.
©2016 Pearson Education Limited.

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

54
× 24 (1)
216
1080
1296 (1)

1 MARK FOR METHOD
CAN USE COLUMN, UNIT ETC

5·4 × 0·24 — 3 DIGITS AFTER DECIMAL POINT IN QUESTION.

1·296

3 digits after dp in answer

1·296 (1)

(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.

1 ÷ 2 = 0·5cm

LB 72 − 0·5

UB 72 + 0·5

Lower bound ↓ Upper bound ↓

71·5 (1) $\leq H <$ 72·5 (1)

(Total 2 marks)

---

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

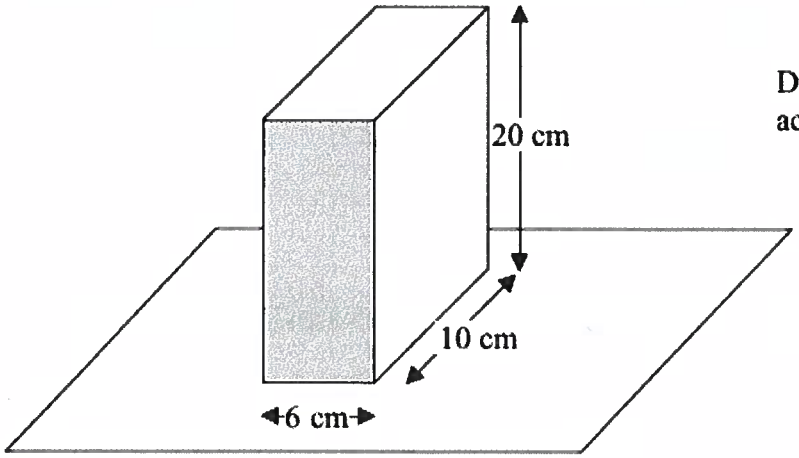


Diagram **NOT** accurately drawn

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

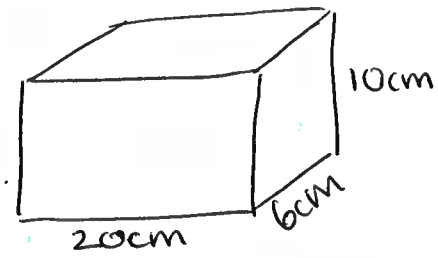
carton only has 8cm of juice (not 20cm)

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 = L x W x H
= 6 x 10 x 8
= 48 x 10
= 480 cm³ (1)

New shape



Use a picture to help

Volume of Juice = L x W x H
480 = 20 x 6 x H
480 = 120 H
H = 480 / 120 (1)
H = 4 cm

Explain what is being calculated

(1)

4 ..... cm

(Total 3 marks)

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

CONVERT TO ORDINARY NUMBERS FIRST!

0.038×10^2 3800×10^{-4} 380 0.38×10^{-1}

3·8 0·38 380 0·038 (1)

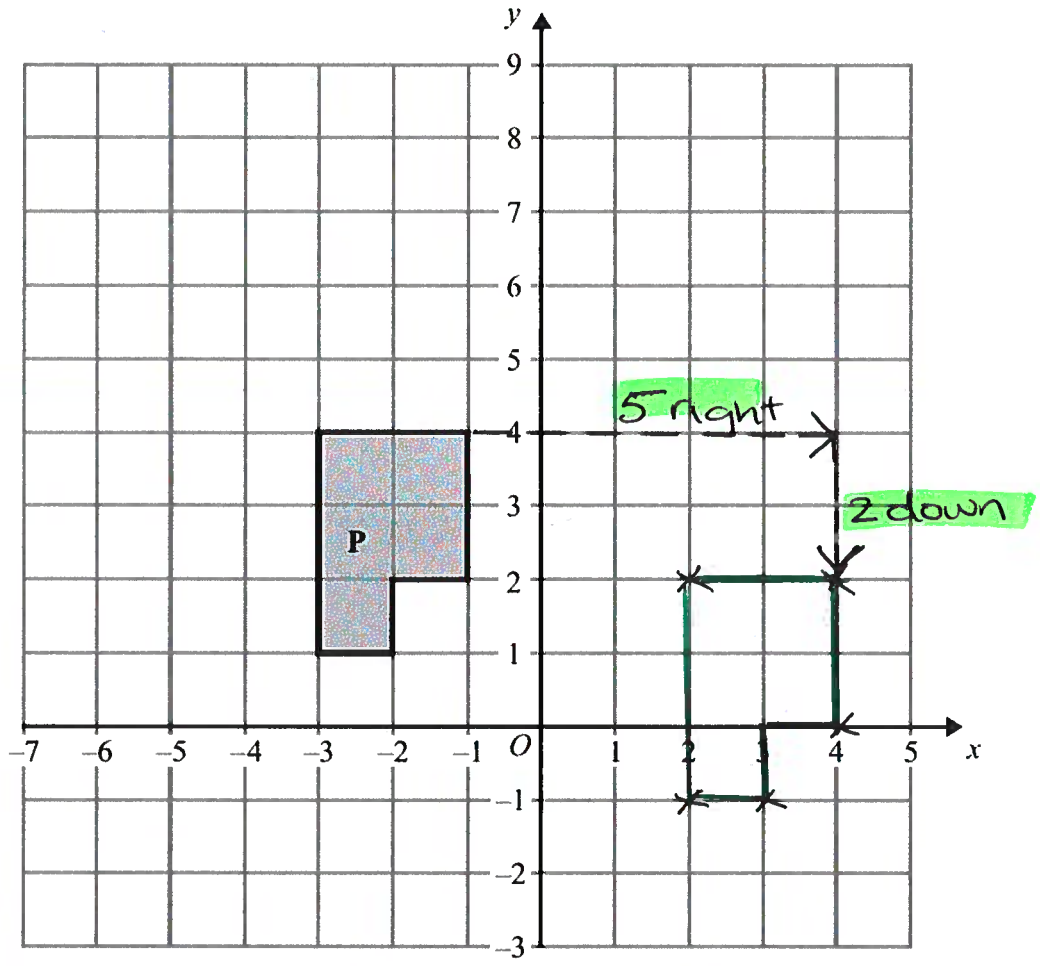
(3) (2) (4) (1)

0.38×10^{-1} 3800×10^{-4} 0.038×10^{2} (1)

(Total 2 marks)

380 GIVE ANSWER USING NUMBERS IN ORIGINAL FORM

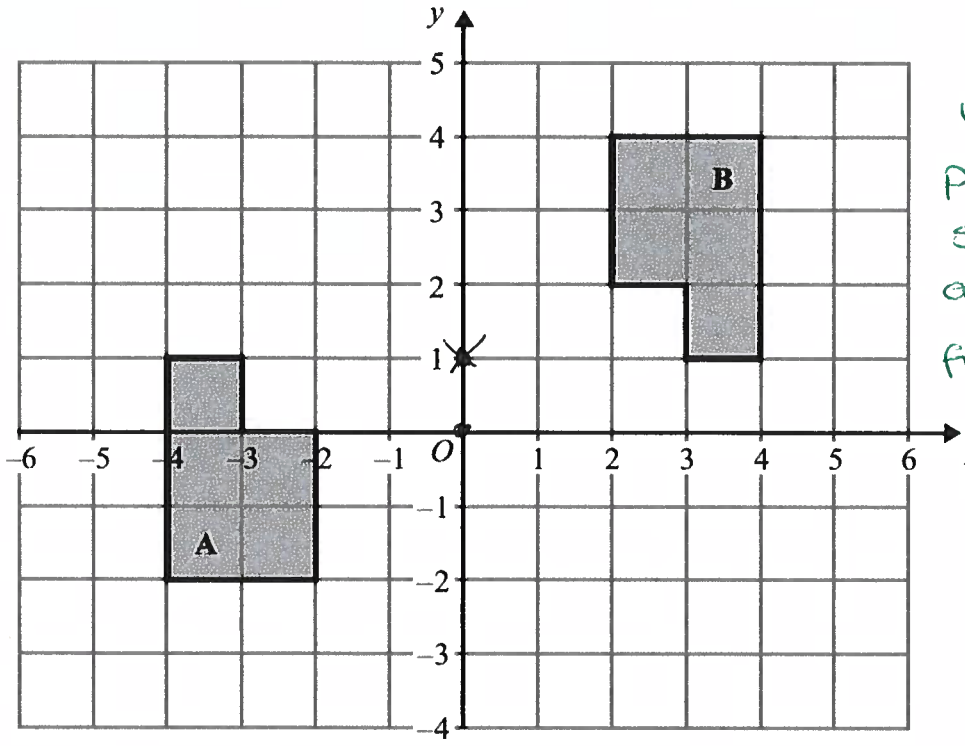
5.



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

(2)

move each vertex by the same vector.



Use tracing paper. Trace shape A and rotate from different points until you get centre of rotation.

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

ROTATION (1) 180° (1) from (0, 1) (1)

(3)

(Total 5 marks)

---

6. (a) Simplify $\dfrac{(x+2)^2}{x+2}$

$\dfrac{(x+2)(x+2)}{x+2}$

Simplify by dividing terms (same) at top and bottom

$x+2$

(1)

(b) Simplify $2a^2b \times 3a^3b$

$2 \times 3 = 6$

$a^2 \times a^3 = a^5$

$b \times b = b^2$

MULTIPLICATION INDEX LAW - Add powers

MULTIPLY COEFFICIENTS $6a^5b^2$

(2)

(Total 3 marks)

1 mark if you get 2 out of 3 terms correct.

---

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?

Label ratio parts

Cement : Sand : Gravel

1 : 3 : 5 1+3+5 = 9 parts

(1) ×20 ↓ ↓×20 ↓×20 180 ÷ 9 = 20 (1)

20kg : 60kg : 100kg (1)

↗

Only have 15 kg (1)

so not enough

cement

(Total 4 marks)

8. Suha has a full 600 m*l* 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 m*l*
Mix $\frac{1}{4}$ of the wallpaper remover with 4500 m*l* of water

Suha is going to use 750 m*l* of water.

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

600 ÷ 4 = 150ml (1) needs 4500ml water
Wallpaper remover

4500 ÷ 750 = 450 ÷ 75

75, 150, 225, 300, 375, 450

450 ÷ 75 = 6 (1)

150ml needs 4500ml
Wallpaper Water

÷6 ↓ ÷6 ↓

25ml (1)

6 | 150
3

750ml

(1)

25 ml

(Total 4 marks)

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

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

midpoints 2 7 12 17 22

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

CF 8 19 28 42 60

(a) Write down the class interval containing the median.

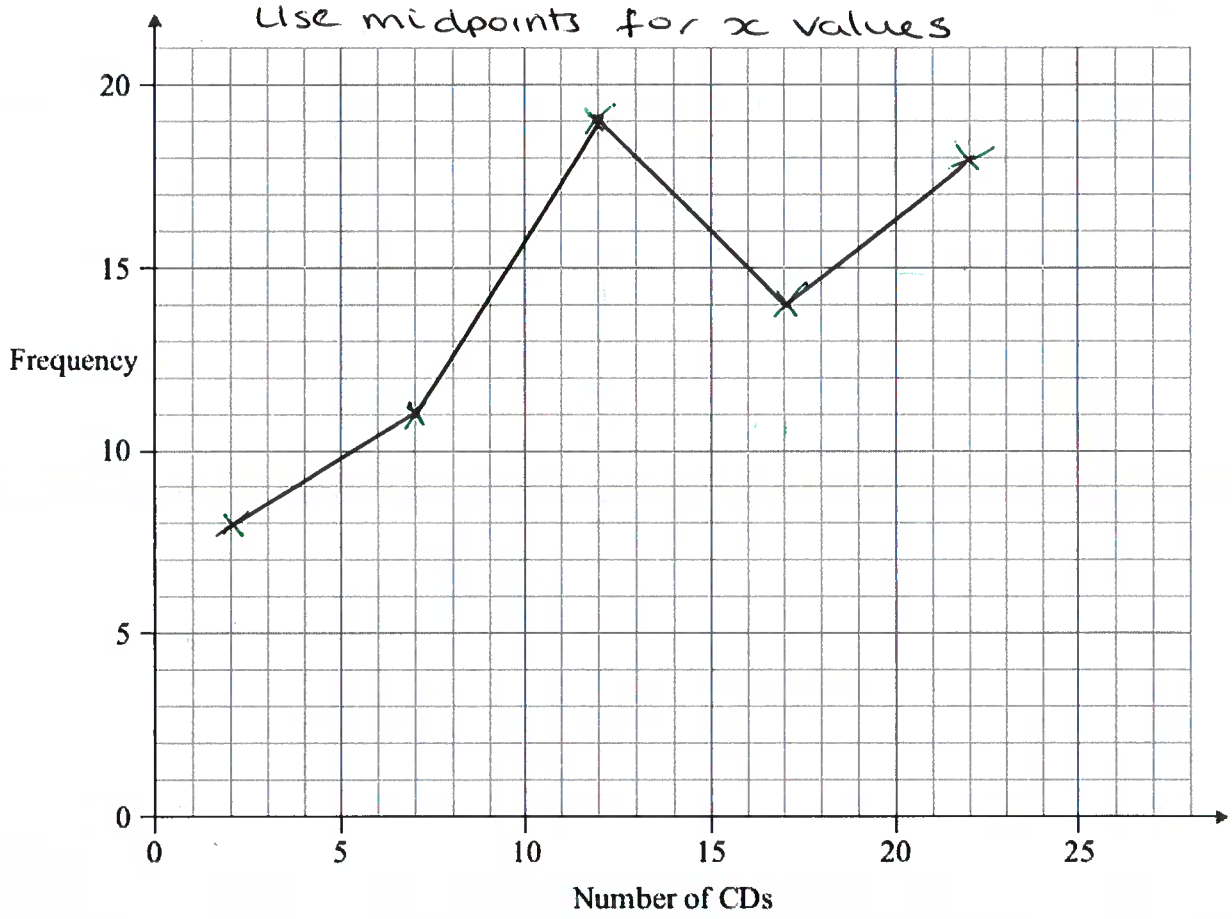
Median is the 30th student
$n = 60$

15 – 19 ↑ give no of CDs not frequency as answer

(1)

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

as answer



(2)

(Total 3 marks)

Plot (2,8) (7,11) (12,9) (17,14) (22,18)

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

$5q + 5p = 4 + 8p$ (1)

$-5p \quad -5p$

$5q = 4 + 3p$ (1)

$\div 5 \quad \div 5$

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

Remove smaller term with p

Remove multiple of 5

$q =$ $\frac{4 + 3p}{5}$ (1)

(Total 3 marks)

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

Expand using a method.

	x	-3	
	x^2	$-3x$	x
	$5x$	-15	5

(1)

Simplify by adding like terms.

(1)

$x^2 + 2x - 15$

(2)

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

↖ Factors of -9

$1, -9$

$-1, 9 \rightarrow 9 - 1 = 8$

$-3, 3$

$(x - 1)(x + 9) = 0$ (2)

$x - 1 = 0 \quad x + 9 = 0$

$x = 1$ or $x = -9$

(1)

1 or -9

(3)

(Total 5 marks)

---

12. (a) Solve the inequality

$3t + 1 < t + 12$

$-t \quad -t$

$2t + 1 < 12$ (1)

$-1 \quad -1$

$2t < 11$

$t < 5.5$

(1)

$t < 5.5$

(2)

(b) t is a whole number.

Write down the largest value of t that satisfies

$3t + 1 < t + 12$

$t < 5.5$

(1)

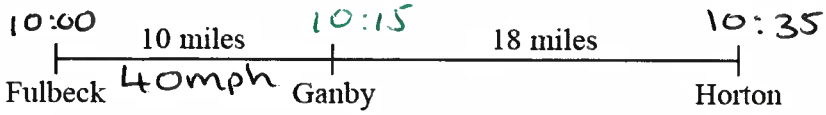
5

(1)

(Total 3 marks)

---

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.

(1)

$s = \frac{d}{t}$ $\quad t = \frac{d}{s} = \frac{10}{40} = \frac{1}{4}$ hour = 15 min

10:15

10:35 − 10:15 = 20 min = $\frac{20}{60} = \frac{1}{3}$rd hour

d = 18 miles

$s = \frac{d}{t} = \frac{18}{1/3}$ i.e. $18 \div \frac{1}{3} = 18 \times 3$ (1)

$= 54$

Calculate the time taken
from Fulbeck to Ganby
Use this information to calculate
the speed from Ganby to Horton

54 (1)

.....mph

(Total 3 marks)

14. M is directly proportional to L^3.

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

Find the value of M when $L = 3$

(1)

$M \propto L^3$

$M = k \times L^3$

$160 = k \times 2^3$

$160 = 8k$

$k = 160 \div 8 = 20$ (1)

Solve for k

Create formula using k

$M = 20L^3$

$= 20 \times 3^3$ (1)

$= 20 \times 27$

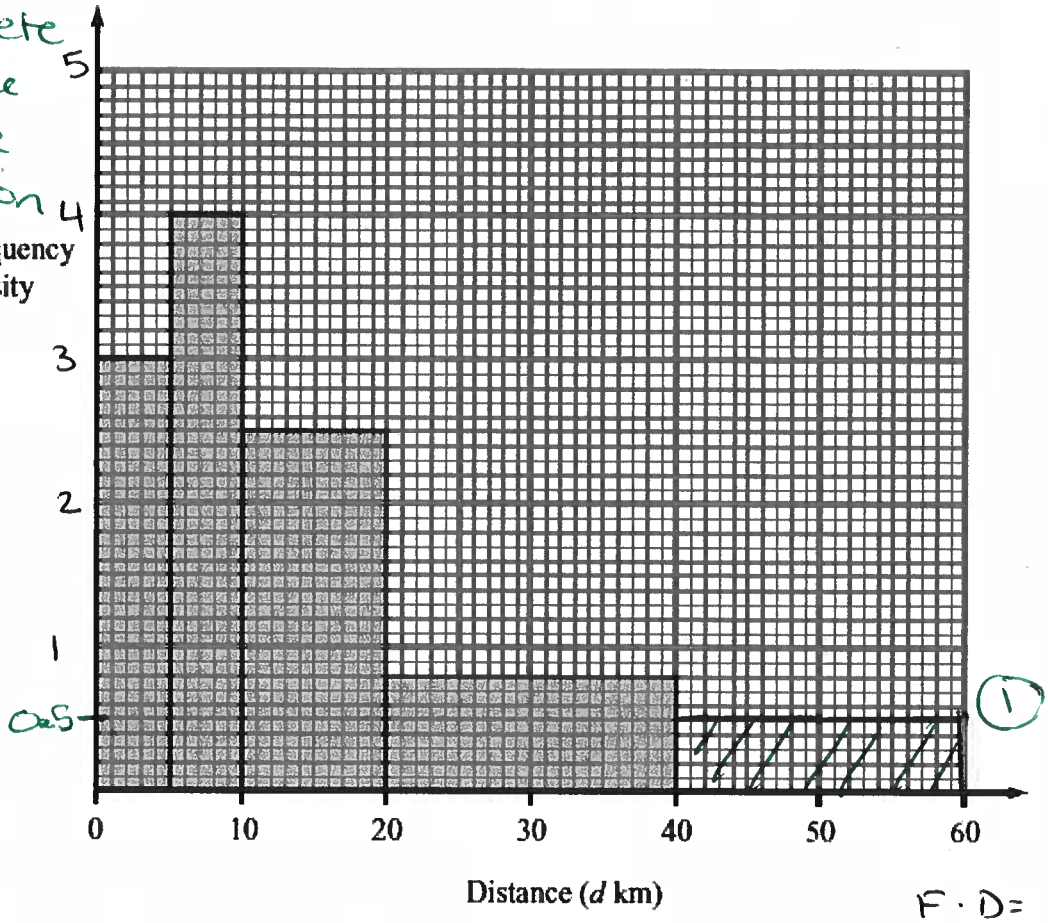
$= 540$

Substitute into formula.

540 (1)

(Total 4 marks)

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



Complete this scale using the information from the table.

F·D = f / C·W

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

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

F·D / 3

4

(1)

0.5

f = FD × CW

(1) f = 2.5 × 10 = 25

f = 0.8 × 20

= 16

(2)

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

(1)

(Total 3 marks)

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

Power of $\frac{1}{2}$ is same as square root

$\sqrt{49} = 7$

7 (1)

.....

(1)

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

Rewrite $\sqrt{45}$ as $\sqrt{9 \times 5}$ · one number must be square

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

$= 3\sqrt{5}$

...3.√5.....

(1)

(Total 2 marks)

---

17. $x = 0.0\dot{4}\dot{5}$

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

(1) $1000x = 45.\dot{4}\dot{5}$

$-10x = 0.\dot{4}\dot{5}$

(1) $990x = 45$

Find multiples of x so that $\dot{4}\dot{5}$ part can be removed

$x = \frac{45}{990}$

$= \frac{9}{198}$

Simplify (in steps)

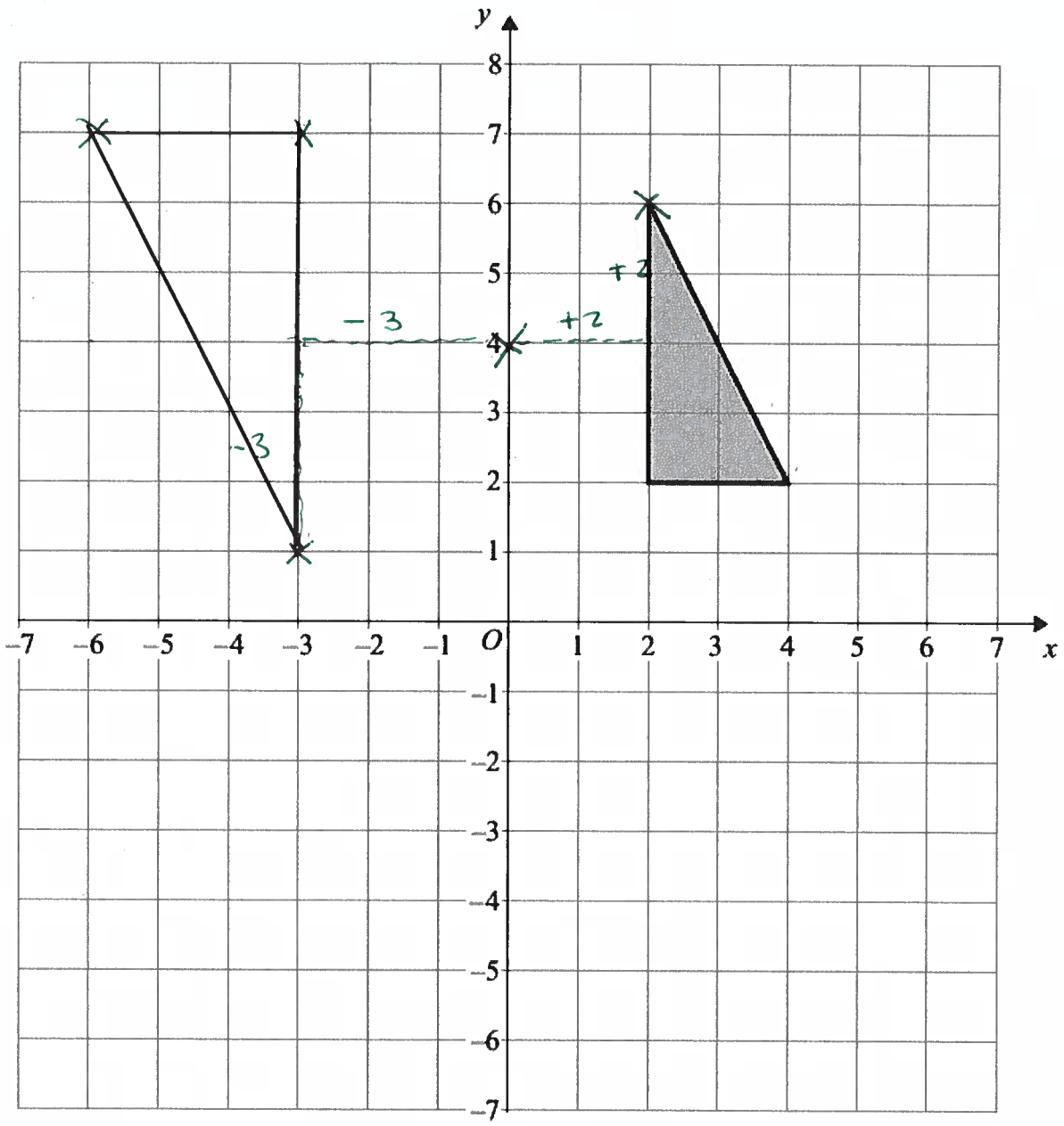
$= \frac{1}{22}$ (1)

$5 \overline{)990}$ → 198 (44)

$9 \overline{)198}$ → 22

(Total 3 marks)

18.



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

(Total 3 marks)

Mark the centre of enlargement.
Multiply each distance to vertex by 1-5
and plot in opposite direction from original.

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

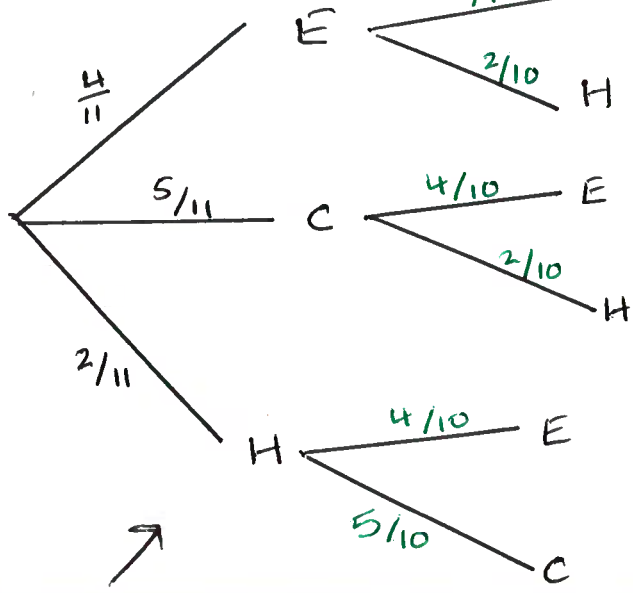
There are

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

Erin takes at random 2 of these sandwiches.

conditional probability so decrease denominator by 1 (only 10 sandwiches for 2nd event)

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



P(EC) = $4/11 \times 5/10 = 20/110$ (1)

P(EH) = $4/11 \times 2/10 = 8/110$

P(CE) = $5/11 \times 4/10 = 20/110$

P(CH) = $5/11 \times 2/10 = 10/110$

P(HE) = $2/11 \times 4/10 = 8/110$

P(HC) = $2/11 \times 5/10 = 10/110$.

USE 'AND' RULE and multiply probabilities

↑ use 'OR' Rule and add probabilities

$$P(\text{different}) = \frac{20+8+20+10+8+10}{110} \quad (2)$$

$$= \frac{76}{110} \quad (1)$$

.....

(Total 5 marks)

20.

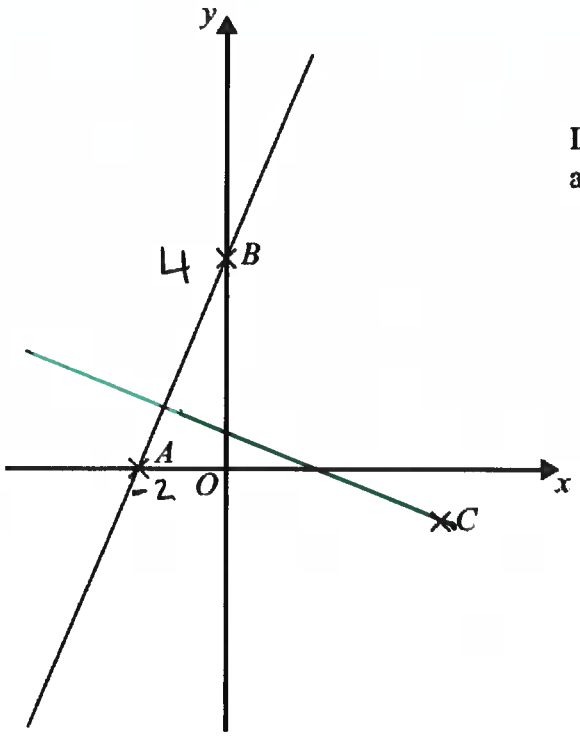


Diagram **NOT** accurately drawn

In the diagram

A is the point $(-2, 0)$ $x_1\ y_1$

B is the point $(0, 4)$ $x_2\ y_2$

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

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

Find gradient of AB

$m_1 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-0}{0-(-2)} = \frac{4}{2} = 2$ (1)

For perpendicular lines $m_1 m_2 = -1$

$2 \times m_2 = -1 \Rightarrow m_2 = -\frac{1}{2}$ (1)

C (5, -1)
x y

$y = mx + c$

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

$-1 = -2.5 + c$ (1)

$+2.5 \quad +2.5$

$c = 1 - 5$

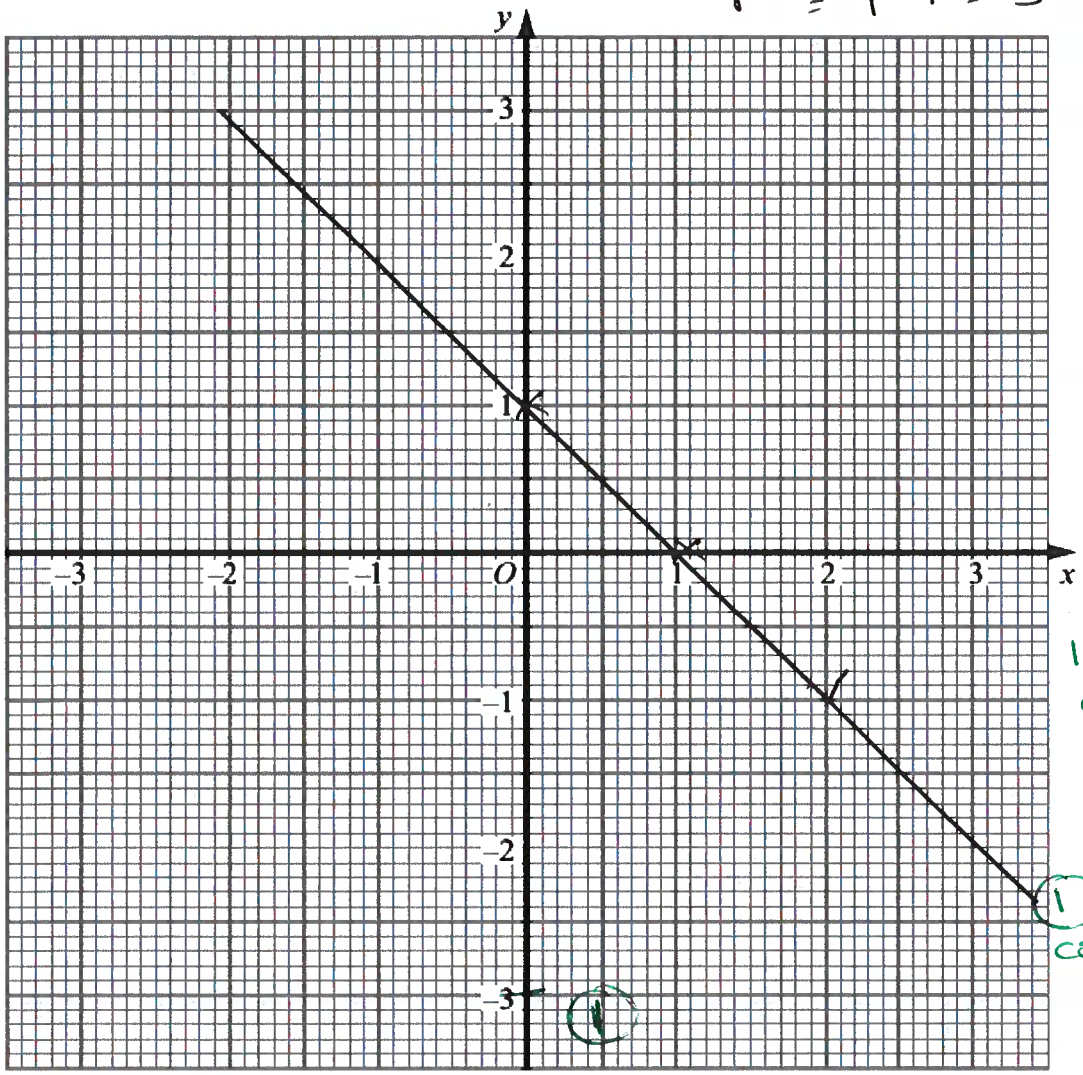
$y = -\frac{1}{2}x + \frac{3}{2}$ (1)

(Total 4 marks)

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

$x^2 + y^2 = r^2$

$r^2 = 9 \quad r = 3$



1 mark for circle with centre O

1 mark for correct circle

(1) correct line $x+y=1$

Set compass to 3 units and draw circle **(2)**

(b) By drawing the line $x + y = 1$ on the grid, solve the equations $x^2 + y^2 = 9$ and $x + y = 1$

create coordinates.

If $x = 1$ then $y = 0$ because $1 + 0 = 1$ (1, 0)

If $y = 1$ then $x = 0$ $0 + 1 = 1$ (0, 1)

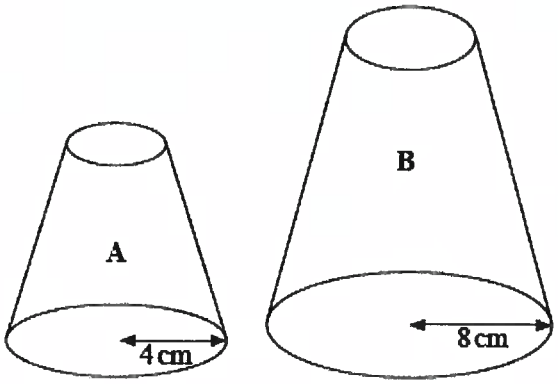
$x =$ 2 -6 , $y =$ -1 -6 (1)

or $x =$ -1 -6 , $y =$ 2 -6 (1)

(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**.

LSF = $8 \div 4 = 2$
(Linear Scale factor)

ASF = 2^2 (1)
(area scale factor)

SA of B = SA of A × SF (area).
= $80 \times 2^2 = 320$

(1)
320 ..... cm^2
(2)

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

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

ASF = 2
VSF = $2^3 = 8$

$600 \div 8$ $8\overline{)600}$ $= 75$

75 ..... cm^3
(2)

(Total 4 marks)

23.

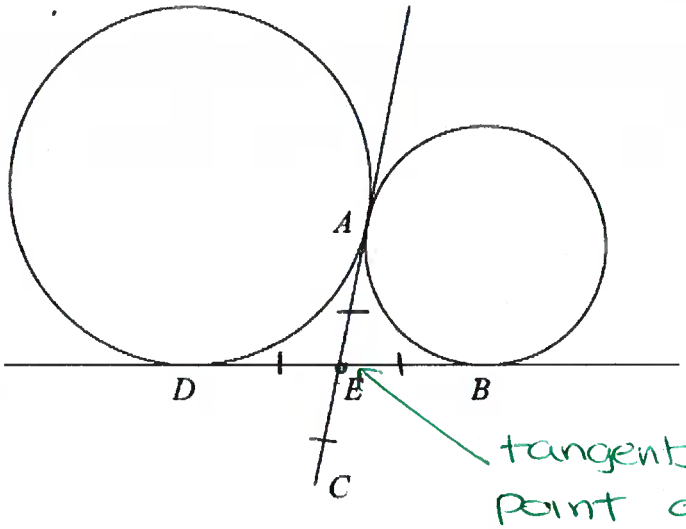


Diagram **NOT** accurately drawn.

tangents from an external point are equal in length

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.

DE = AE (triangle AED is isosceles)

AE = DE = EB = EC

Diagonals are equal and bisect each other.

hence DB = AC

hence shape is a rectangle.

therefore ABCD is a rectangle

(Total 4 marks)

TOTAL FOR PAPER IS 80 MARKS