GCSE Mathematics Practice Tests: Set 2

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.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1.

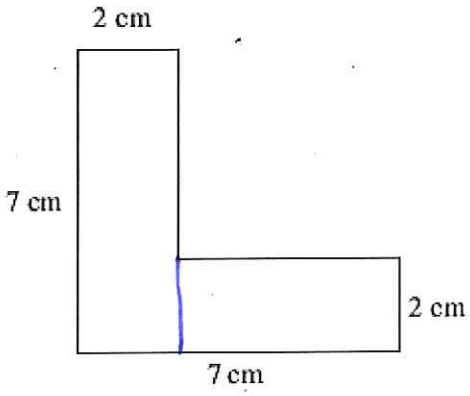

Diagram **NOT** accurately drawn

The diagram shows the cross-section of a solid prism.
The length of the prism is 2 m. ← 200cm

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

Work out the mass of the prism.

$2 \times 7 = 14cm^2$ +

$2 \times 5 = 10cm^2$

Total cross section = $24cm^2$

$24 \times 200 = 4800cm^3$

Mass = 4800×8 = 38 400g or 38.4kg

38 400g

(Total 5 marks)

2. Dylan is driving from London to Newcastle.
He will drive a total distance of 240 miles.

Dylan leaves London at 09:30

It takes him $1\frac{1}{2}$ hours to travel the first 90 miles.

$1\frac{1}{2}$ hrs = 90 mins.

(a) Use this information to estimate the time Dylan will arrive in Newcastle.
You must show how you get your answer.

$\frac{90 \text{ miles}}{90 \text{ mins}} = 1 \text{ mile/min.}$

$\therefore$ 240 miles = 240 mins
= 4 hrs.

9.30 + 4 hrs = 1.30 pm

1.30 pm

(3)

(b) Write down **one** assumption you made in your answer to part (a).
If your assumption is wrong, how would this affect your answer to part (a)?

that Dylan drove at a constant speed, and didn't stop. If he did it would mean he would arrive earlier/later.

(1)
(Total 4 marks)

3. Arwen buys a car for £4000
The value of the car depreciates by 10% each year.

Work out the value of the car after two years.

$10\% = \frac{4000}{10} = 400$

1st — $4000 - 400 = 3600$

$10\% = \frac{3600}{10} = 360$

2nd — $3600 - 360 = 3240$

£ 3240

(Total 3 marks)

4. 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.

$\frac{600}{4} = 150ml$ $\frac{750}{4500} = \frac{1}{6}$.

$150 \times \frac{1}{6} = 25ml$

OR

$\frac{150}{6} = 25ml$

25 .....m*l*

(Total 4 marks)

5. There are 18 packets of sweets and 12 boxes of sweets in a carton.

The mean number of sweets in all the 30 packets and boxes is 14.
The mean number of sweets in the 18 packets is 10.

Work out the mean number of sweets in the boxes.

$30 \times 14 = 420$

$18 \times 10 = 180$

$420 - 180 = 240$

$\frac{240}{12} = 20$

20

.....

(Total 3 marks)

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

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

3.8 0.38 0.038

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

.....

(Total 2 marks)

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7. Find the value of n so that $\frac{2^6 \times 2^3}{2^n} = 2^5$

$\frac{2^9}{2^n} = 2^5$

$n = 4$

(Total 2 marks)

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8. $-6 \leq 2y < 5$ $\div 2$

y is an integer.

Write down all the possible values of y.

$-3 \leq y < 2.5$

$y = -3, -2, -1, 0, 1, 2,$ [redacted]

$-3, -2, -1, 0, 1, 2$

(Total 3 marks)

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9. x and y are two numbers each greater than 3

The Highest Common Factor (HCF) of x and y is 3
The Lowest Common Multiple (LCM) of x and y is 36 - Factors of 36

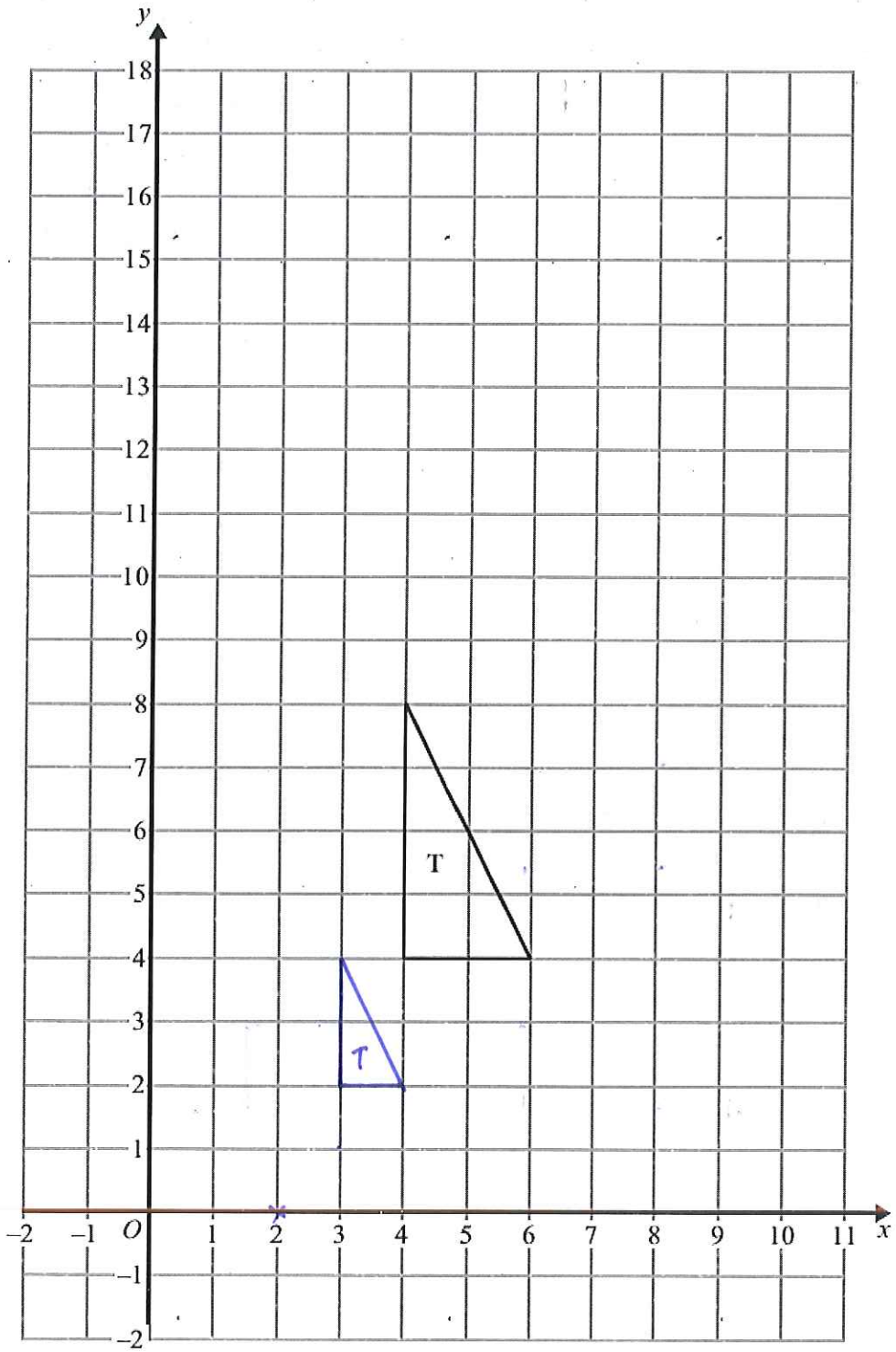
Find x and y.

1 x 36
2 x 18
3 x 12
4 x 9
6 x 6

9, 12

(Total 2 marks)

10.



Enlarge triangle **T** by a scale factor $\frac{1}{2}$, centre (2, 0).

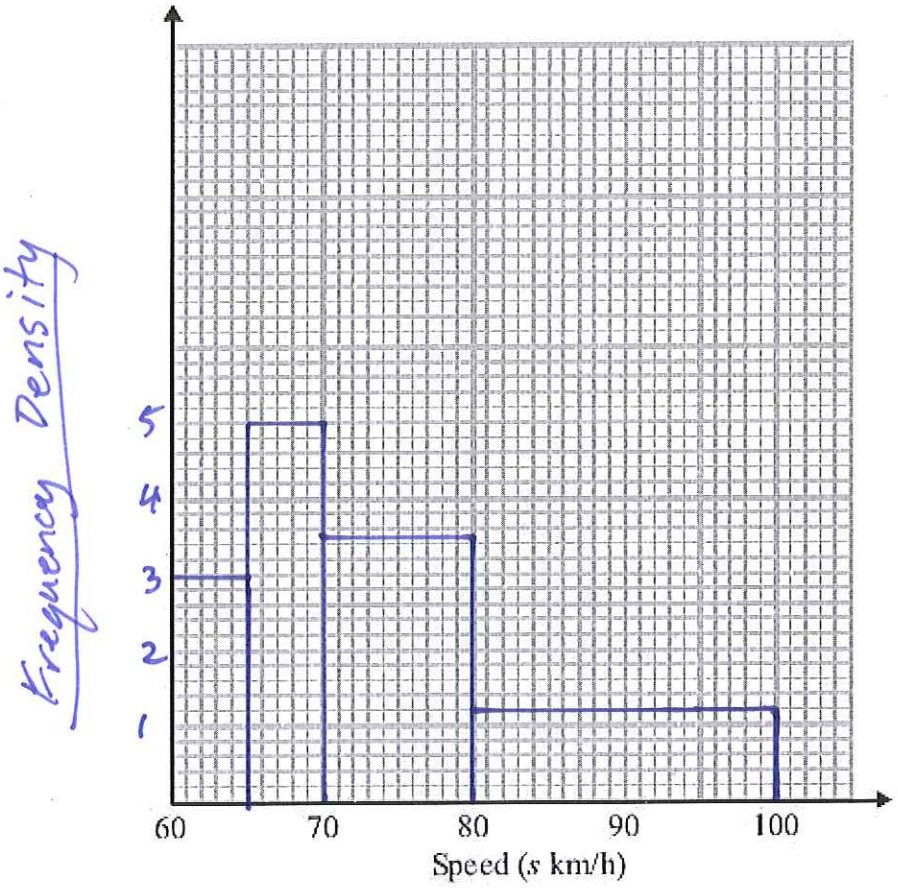
(Total 3 marks)

11. The table gives some information about the speeds, in km/h, of 100 cars.

Speed(s km/h)	Frequency
$60 < s \leq 65$	15
$65 < s \leq 70$	25
$70 < s \leq 80$	36
$80 < s \leq 100$	24

F.D
$15 \div 5 = 3$
$25 \div 5 = 5$
$36 \div 10 = 3.6$
$24 \div 20 = 1.2$

(a) On the grid, draw a histogram for the information in the table.



(3)

(b) Work out an estimate for the number of cars with a speed of more than 85 km/h.

$100 - 80 = 20$

$100 - 85 = 15$

$\frac{15}{20} = \frac{3}{4}$

$\frac{3}{4} \times 24$

18

.....

(2)

(Total 5 marks)

Factorise

12. (a) Simplify fully $\dfrac{x^2+3x-4}{2x^2-5x+3}$

$\dfrac{(x+4)(x-1)}{(2x-3)(x-1)}$

$\dfrac{x+4}{2x-3}$

.....

(3)

(b) Write $\dfrac{4}{x+2}+\dfrac{3}{x-2}$ as a single fraction in its simplest form.

Expand $4x-8$ $\quad$ $3x+6$ $\quad$ Expand

$\dfrac{4(x-2)}{(x+2)(x-2)}+\dfrac{3(x+2)}{(x-2)(x+2)}$

$\dfrac{4x-8}{x^2-4}+\dfrac{3x+6}{x^2-4}$

$\dfrac{7x-2}{x^2-4}$

$= \dfrac{7x-2}{x^2-4}$

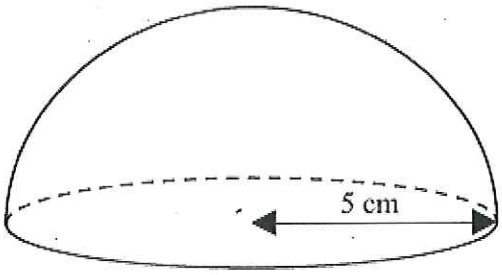
.....

(3)

(Total 6 marks)

13. The diagram shows a solid hemisphere of radius 5 cm.

Surface area of sphere $= 4\pi r^2$



Find the **total** surface area of the solid hemisphere.
Give your answer in terms of π.

SA of hemisphere $= 2\pi r^2 + \pi r^2$

$= 3\pi r^2$

$= 3\pi(5)^2$

$= 3\pi 25$

$= 75\pi$

75π ..... cm^2

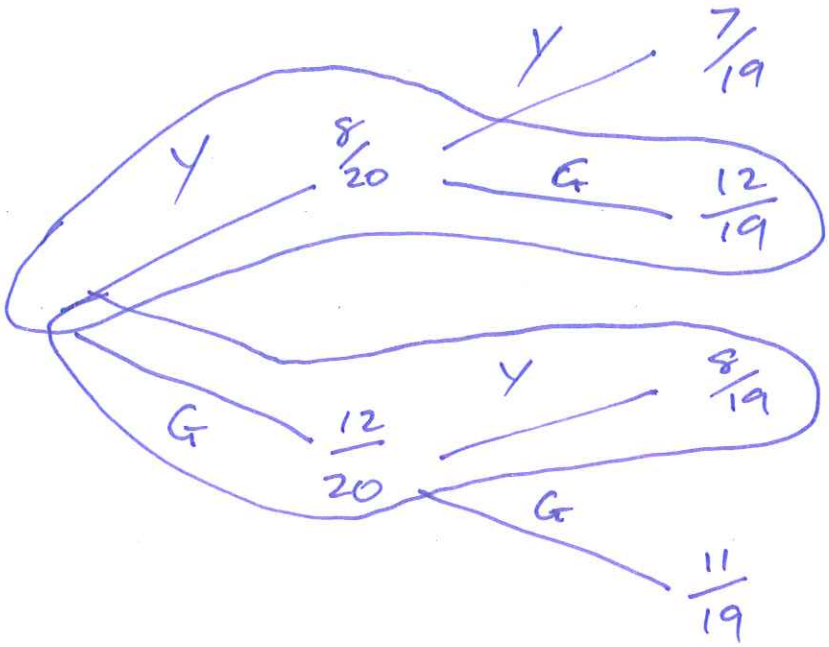
(Total 3 marks)

14. There are 20 counters in a bag.

8 of the counters are yellow. 8/20
12 of the counters are green. 12/20

Asif takes at random two of the counters.

Work out the probability that the two counters are different colours.



$\frac{8}{20} \times \frac{12}{19} = \frac{96}{380}$

$+$

$\frac{12}{20} \times \frac{8}{19} = \frac{96}{380}$

$\frac{96 + 96}{380} = \frac{192}{380}$

$\frac{192}{380}$

.....

(Total 4 marks)

15. n is an integer greater than 1.

Use algebra to show that $(n^2 - 1) + (n - 1)^2$ is always equal to an even number.

, expand

$n^2 - 1 + n^2 - 2n + 1$

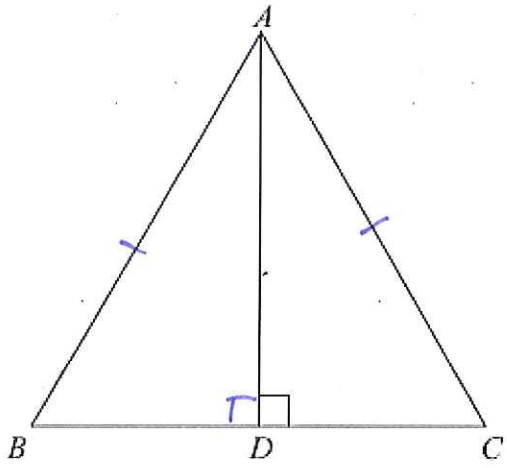
$= 2n^2 - 2n$ ← Factorise

$= 2(n^2 - n)$

2 multiplied by any whole number is even.

(Total 4 marks)

16.



ABC is an equilateral triangle.
D lies on *BC*.
AD is perpendicular to *BC*.

(a) Prove that triangle *ADC* is congruent to triangle *ADB*.

H ← AB = AC (Because equilateral triangle)

S ← AD = AD – Shared side (common)

R ← ∠ADC = ∠ADB – both right angles because perpendicular

So congruent because RHS.

(3)

(b) Hence, prove that $BD = \frac{1}{2}AB$.

BD = DC (congruent triangles)

BC = AB (Equilateral triangle)

Hence $BD = \frac{1}{2}AB$

(2)

(Total 5 marks)

17. (a) Rationalise the denominator of $\frac{6}{\sqrt{5}}$

$\frac{6}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{6\sqrt{5}}{5}$

$\frac{6\sqrt{5}}{5}$

.....

(2)

(b) Expand and simplify $(2 + \sqrt{10})(\sqrt{5} + \sqrt{20})$

$2\sqrt{5} + 2\sqrt{20} + \sqrt{10}\sqrt{5} + \sqrt{10}\sqrt{20}$

$= 2\sqrt{5} + 4\sqrt{5} + 5\sqrt{2} + 10\sqrt{2}$

$= 6\sqrt{5} + 15\sqrt{2}$

$6\sqrt{5} + 15\sqrt{2}$

.....

(4)

(Total 6 marks)

$\sqrt{20} = \sqrt{4 \times 5} = \sqrt{4} \times \sqrt{5} = 2\sqrt{5}$

$\therefore 2 \times 2\sqrt{5} = 4\sqrt{5}$

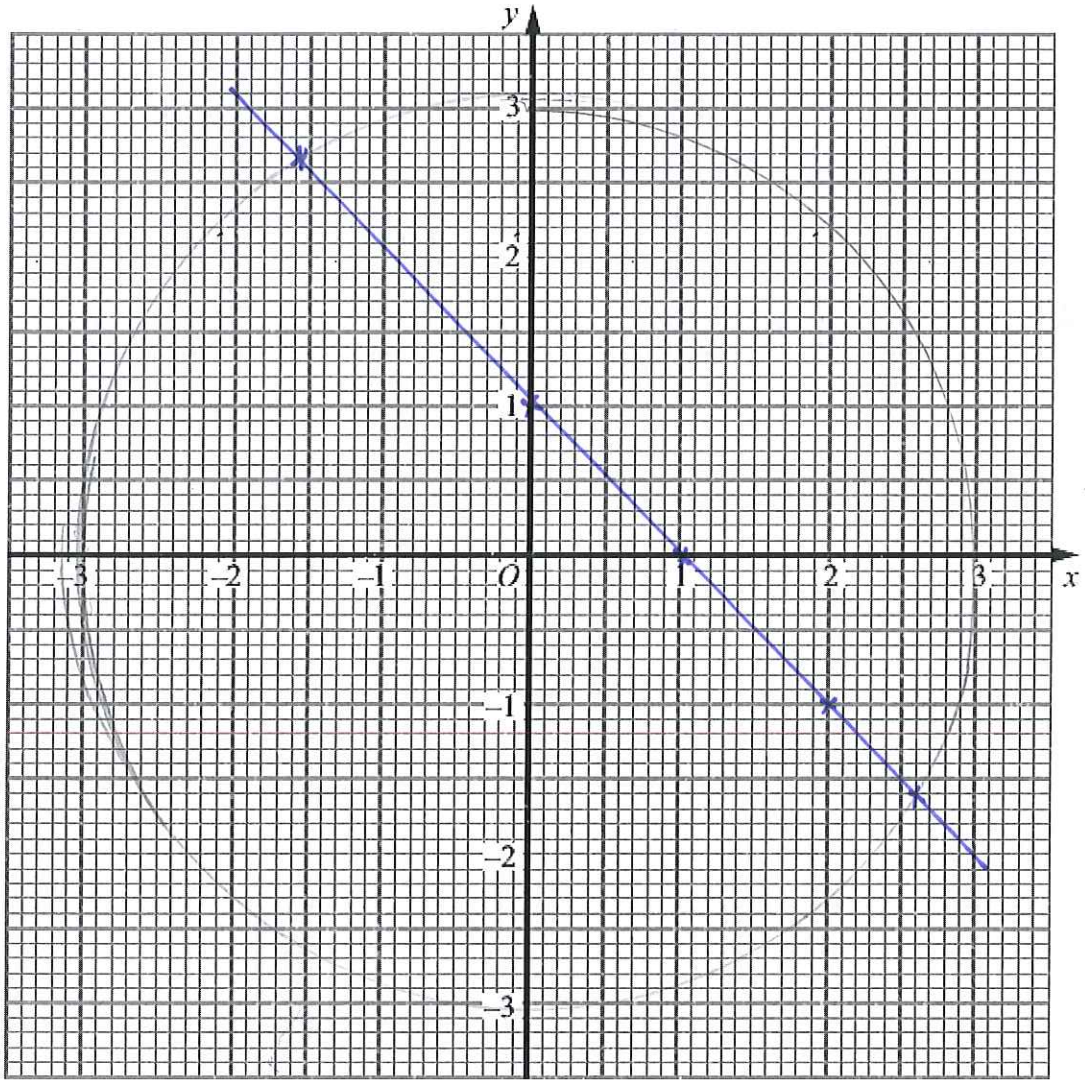
$\sqrt{10}\sqrt{5} = \sqrt{50} = \sqrt{25 \times 2} = \sqrt{25} \times \sqrt{2} = 5\sqrt{2}$

$\sqrt{10}\sqrt{20} = \sqrt{200} = \sqrt{100 \times 2} = \sqrt{100} \times \sqrt{2} = 10\sqrt{2}$

$x^2 + y^2 = r^2$ $\sqrt{9} = 3$

$r = 3$

18. (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 $x^2 + y^2 = 9$
$x + y = 1$

x	0	1	2
y	1	0	−1

$x =$ 2.6 , $y =$ −1.6

or $x =$ −1.6 , $y =$ 2.6

(3)

(Total 5 marks)

19. P is inversely proportional to V.

When $V = 8$, $P = 5$

(a) Find a formula for P in terms of V.

$P = \frac{k}{V}$ $\therefore k = 40$

$5 = \frac{k}{8}$ $P = \frac{40}{V}$

$P =$ $\frac{40}{V}$

(3)

(b) Calculate the value of P when $V = 2$

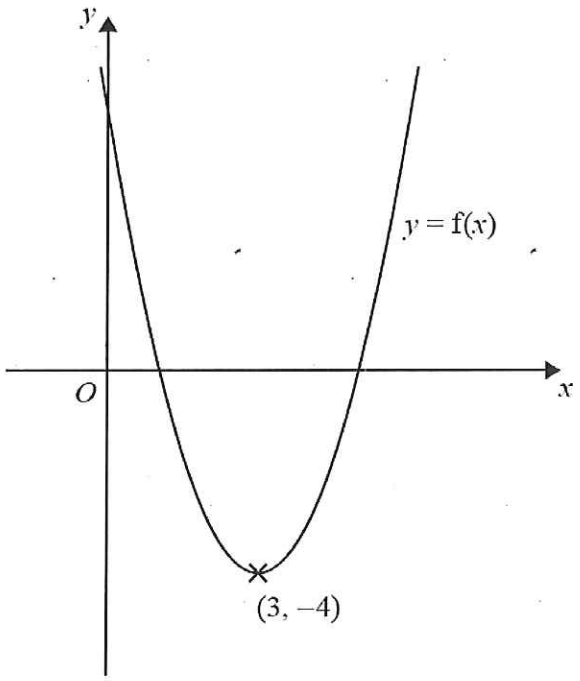
$P = \frac{40}{2}$

20

(1)

(Total 4 marks)

20.



The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the minimum point of this curve are $(3, -4)$.

Write down the coordinates of the minimum point of the curve with equation

(i) $y = f(x) + 3$

(3 , −1)

(ii) $y = f(2x)$

(1.5 , −4)

(iii) $y = f(-x)$

(−3 , −4)

(Total 3 marks)

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21. A has coordinates $(-3, 0)$

B has coordinates $(1, 6)$

C has coordinates $(5, 2)$

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

Give your equation in the form $ax + by = c$ where a, b and c are integers.

Gradient of AB $\frac{6-0}{1--3} = \frac{6}{4} = \frac{3}{2}$

Gradient of line: $-1 \div \frac{3}{2} = -\frac{2}{3}$

$y = mx + c$

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

sub in $x = 5$, $y = 2$

$2 = -\frac{2}{3} \times 5 + c$

$2 = \frac{-10}{3} + c$

$c = 2 + \frac{10}{3}$ $\quad c = \frac{16}{3}$

$y = -\frac{2}{3}x + \frac{16}{3}$

$3y = -2x + 16$

$3y + 2x = 16$

$3y + 2x = 16$

(Total 4 marks)

TOTAL FOR PAPER IS 80 MARKS