edexcel

GCSE Mathematics Practice Tests: Set 4

Paper 2H (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.

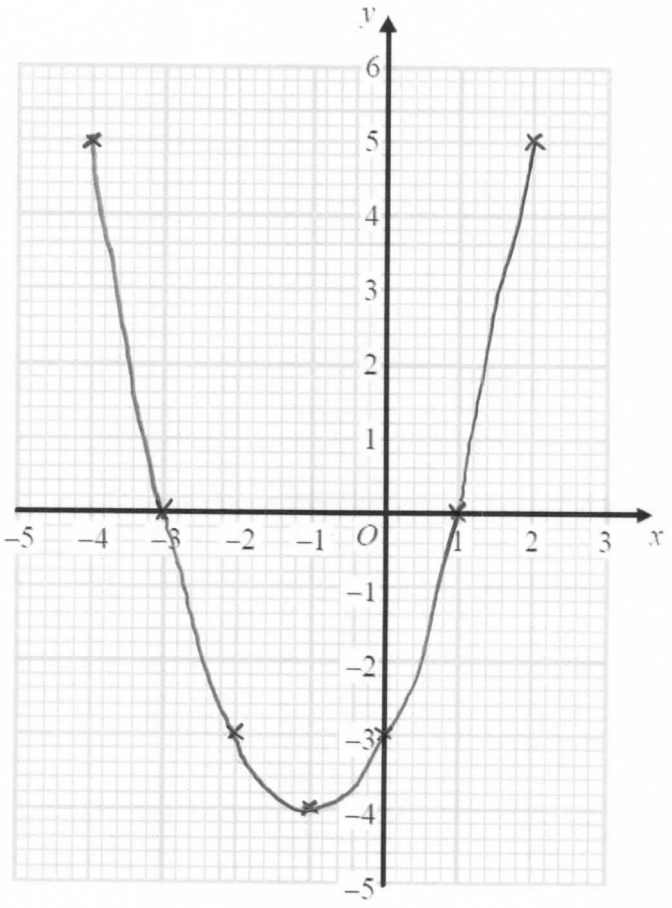
You must write down all the stages in your working.

1. (*a*) Complete the table of values for $y = x^2 + 2x - 3$.

x	–4	–3	–2	–1	0	1	2
y	5	0	–3	–4	–3	0	5

(2)

(*b*) On the grid, draw the graph of $y = x^2 + 2x - 3$ for values from –4 to 2.



(2)

(Total 4 marks)

2. Nick has 2 cars.
Car A uses petrol.
Car B uses diesel.

Petrol costs £1.39 per litre.
Diesel costs £1.47 per litre.

The table below shows the average distance that Nick can drive each car using 1 litre of fuel.

Car A	10.3 miles per litre of petrol
Car B	14.6 miles per litre of diesel

Nick is going on a journey in one of his cars.
The distance Nick is going to drive is 450 miles.

Work out the difference of the total costs of the fuel for the 2 cars for this journey.

Car A cost $\frac{450}{10.3} \times £1.39 = £60.73$

Car B cost $\frac{450}{14.6} \times £1.47 = £45.31$ −

$£15.42$

Car B £ 15.42 cheaper

(Total 4 marks)

3. Stefan is x years old.

Martin is 5 years younger than Stefan.
James is twice as old as Stefan.

The sum of their ages, in years, is less than 30
Work out the oldest age Stefan can be.

Give your answer as a whole number of years.

Stefan x

Martin $x - 5$

James $2x$

$2x + x - 5 + x < 30$

$4x - 5 < 30$

$4x < 30 + 5$

$4x < 35$

$x < \frac{35}{4}$

$x < 8\frac{3}{4}$

so max $x = 8$

8 .....years

(Total 4 marks)

4. Neville saw this car for sale.

He got a discount of 25% off the price of the car.
He paid £7200 for the car.

Work out the price of the car before the discount.

£7200 = 75%

£7200 × $\frac{100}{75}$ = £9600 = 100%

£ 9600

(Total 3 marks)

5. Shabeen has a biased coin.
The probability that the coin will land on heads is 0.6.

Shabeen is going to throw the coin 3 times.

She says the probability that the coin will land on tails 3 times is less than 0.1.

Is Shabeen correct?
You must show all your working.

$P(\text{Tail}) = 0.4$

$P(3 \text{ Tails}) = 0.4 \times 0.4 \times 0.4 = 0.064 < 0.1$

Yes she is correct

(Total 3 marks)

6. $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{\text{even numbers}\}$

$B = \{\text{multiples of 3}\}$

(*a*) List the members of set B.

3, 6, 9

.....

(1)

(*b*) Find $A \cup B$

$\{2, 3, 4, 6, 8, 9, 10\}$

.....

(1)

(*c*) Find $A \cap B$

$\{6\}$

.....

(1)

x is a member of $\mathscr{E}$

$x \in B$

$x \notin A$

(*d*) What are the possible values of x?

3 or 9

.....

(2)

(Total 5 marks)

7. x and y are integers such that

$$-2 \leq x < 3$$

and $$-1 < y \leq 4$$

Find the values of x and y when $x = y$.

x could be $-2, -1, 0, 1, 2$

y could be $0, 1, 2, 3, 4$

$0, 1, 2$

.....

(Total 2 marks)

8. Keith, Ben and Liz tested a coin to find out if it was biased.
They each threw the coin a number of times.
They counted the number of heads and the number of tails they each got.

The table gives information about their results.

	Keith	**Ben**	**Liz**
Number of heads	12	34	57
Number of tails	28	66	243

(a) Which person, Keith, Ben or Liz, will have the best estimate for the probability of getting a head on this coin? Explain your answer.

Liz because she carried out the most trials

(1)

(b) Using all the results in the table, work out an estimate for the probability that the next throw of the coin will be a head.

Heads 12 + 34 + 57 = 103

Tails 28 + 66 + 243 = 337 +

Total Trials 440

$P(\text{Head}) = \frac{103}{440}$

(2)

(Total 3 marks)

9. *ABC* is a triangle.

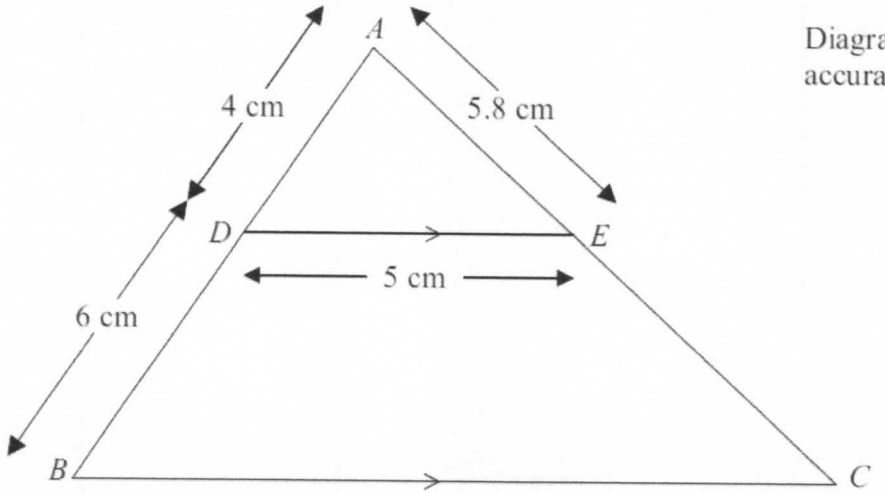


Diagram **NOT** accurately drawn

D is a point on *AB* and *E* is a point on *AC*.
DE is parallel to *BC*.
AD = 4 cm, *DB* = 6 cm, *DE* = 5 cm, *AE* = 5.8 cm.

Calculate the perimeter of the trapezium *DBCE*.

$\triangle s$ $\begin{matrix} ADE \\ ABC \end{matrix}$ are similar

$\frac{AD}{AB} = \frac{4}{10} = \frac{2}{5}$ Ratio of corresponding sides $= 2:5$

$BC = \frac{5}{2} \times DE = \frac{5}{2} \times 5 = 12.5\text{ cm}$

$AC = \frac{5}{2} \times AE = \frac{5}{2} \times 5.8 = 14.5\text{ cm}$

$EC = AC - AE = 14.5 - 5.8 = 8.7\text{cm}$

Perimeter of trapezium DBCE

$= DB + BC + CE + ED$

$= 6 + 12.5 + 8.7 + 5$

$= 32.2\text{ cm}$

32.2 ..... cm

(Total 4 marks)

10. Joe and Ann buy some fruit from the same shop.

Joe buys 4 apples and 3 bananas for £2.50
Ann buys 3 apples and 4 bananas for £2.40

Work out the cost of

(i) one apple,

(ii) one banana.

$4a + 3b = 2.5$ (1)

$3a + 4b = 2.4$ (2)

(1) × 4 $16a + 12b = 10$ (3)

(2) × 3 $9a + 12b = 7.2$ (4)

(3) − (4) $7a = 2.8$

$a = \frac{2.8}{7}$

$a = 0.4$ $a = 40p$

Sub for a in (1)

$4(0.4) + 3b = 2.5$

$1.6 + 3b = 2.5$

$3b = 2.5 - 1.6$

$3b = 0.9$

$b = \frac{0.9}{3}$

$b = 0.3$ $b = 30p$

(i) one apple ..... 40 ..... p

(ii) one banana ..... 30 ..... p

(Total 5 marks)

11. Gail invests in an account that pays compound interest of 5% per annum.

How many years does it take to double the money in her investment?

£1 needs to grow to £2

$1 \times 1.05^{6} = 1.34$

$1 \times 1.05^{10} = 1.63$

$1 \times 1.05^{12} = 1.80$

$1 \times 1.05^{14} = 1.98$

$1 \times 1.05^{15} = 2.07$

15 years

(Total 2 marks)

12. There are only

4 mint biscuits
and 1 toffee biscuit in a tin.

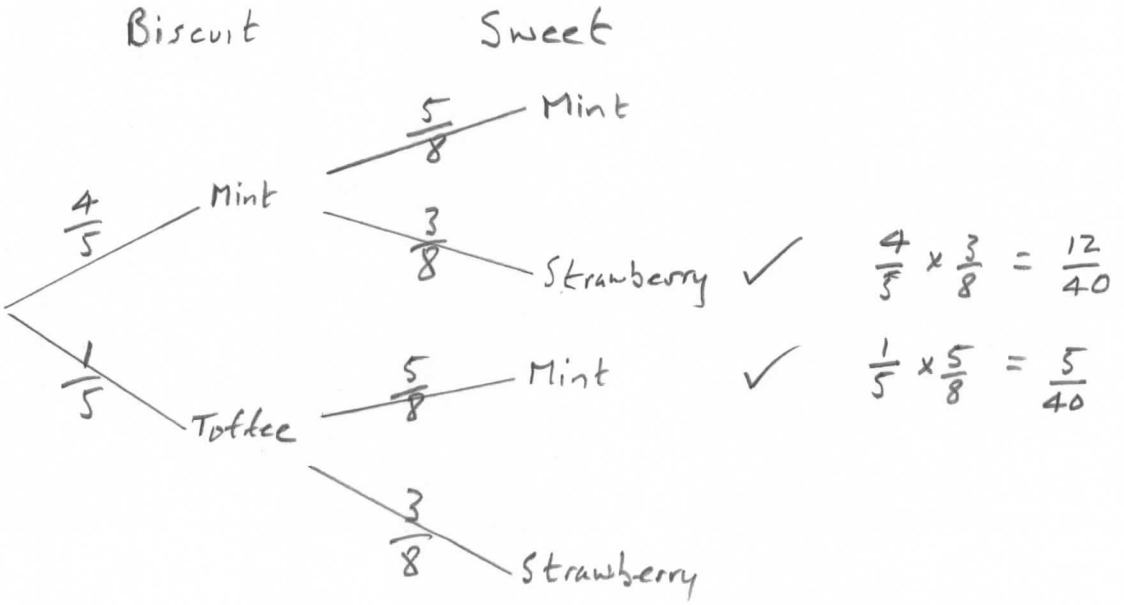
There are only

5 mint sweets
and 3 strawberry sweets in a packet.

Michael's mum lets him take one biscuit from the tin and one sweet from the packet.

Michael takes a biscuit at random from the tin.
He also takes a sweet at random from the packet.

Work out the probability that either the biscuit is mint or the sweet is mint, but not both.



✓ $\frac{4}{5} \times \frac{3}{8} = \frac{12}{40}$

✓ $\frac{1}{5} \times \frac{5}{8} = \frac{5}{40}$

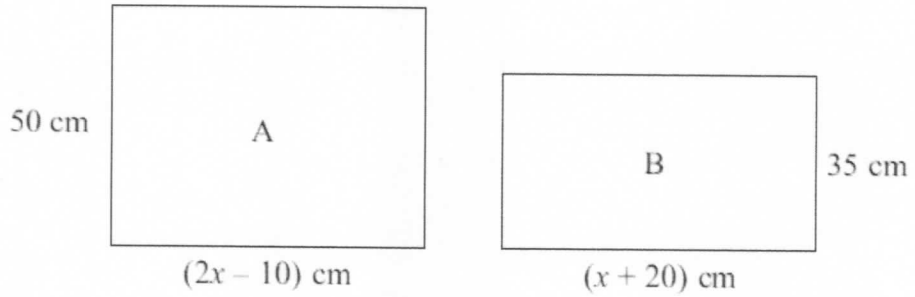
$P(\text{Exactly one mint item}) = \frac{12}{40} + \frac{5}{40} = \frac{17}{40}$

$\frac{17}{40}$

.....

(Total 3 marks)

13. The diagram gives information about two paintings, A and B.
Each painting is in the shape of a rectangle.



Painting A has an area 1725 cm^2 bigger than the area of painting B.

Work out the area of painting A.

$50(2x-10) = 35(x+20) + 1725$

$100x - 500 = 35x + 700 + 1725$

$100x - 35x = 700 + 1725 + 500$

$65x = 2925$

$x = \frac{2925}{65}$

$x = 45$

Area of A $= 50(2(45)-10)$

$= 50 \times 80$

$= 4000 \text{ cm}^2$

4000 cm^2

(Total 4 marks)

14. The average fuel consumption (c) of a car, in kilometres per litre, is given by the formula

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

where d is the distance travelled in kilometres and f is the fuel used in litres.

$d = 190$ correct to 3 significant figures.
$f = 25.7$ correct to 1 decimal place.

By considering bounds, work out the value of c to a suitable degree of accuracy.
You must show **all** of your working **and** give a reason for your final answer.

$189.5 \leq d < 190.5$

$25.65 \leq f < 25.75$

Max $c = \frac{190.5}{25.65} = 7.4269$

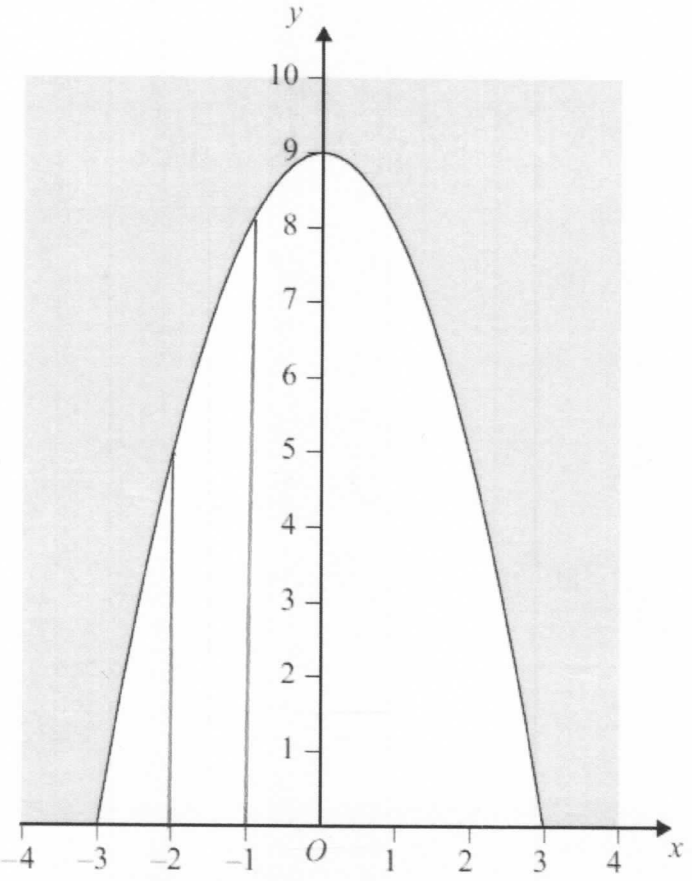
Min $c = \frac{189.5}{25.75} = 7.3592$

Both agree to 1 decimal place

so say $c = 7.4$ km/litre to 1 d.p

(Total 5 marks)

15. Here is a sketch of the graph of $y = 9 - x^2$



The graph is used to model the cross section of a tunnel.
The unshaded area is the cross section of the tunnel.

Calculate an estimate of the area of the cross section of the tunnel.

x_0	x_1	x_2	x_3	x_4	x_5	x_6
-3	-2	-1	0	1	2	3
y_0	y_1	y_2	y_3	y_4	y_5	y_6
0	4.9	8.1	9	8.1	4.9	0

$$\text{Area} \approx \frac{h}{2}\left[y_0 + 2(y_1 + y_2 + y_3 + y_4 + y_5) + y_6\right]$$
$$\approx \frac{1}{2}\left[0 + 2(4.9 + 8.1 + 9 + 8.1 + 4.9) + 0\right]$$
$$\approx \frac{1}{2} \times 70$$

35 units^2

(Total 4 marks)

16. The number of rabbits on a farm n months from now is R_n where

$R_0 = 200$

$R_{n+1} = 1.2R_n - 35$

How many rabbits will there be on the farm 3 months from now?

$R_1 = 1.2 \times 200 - 35 = 205$

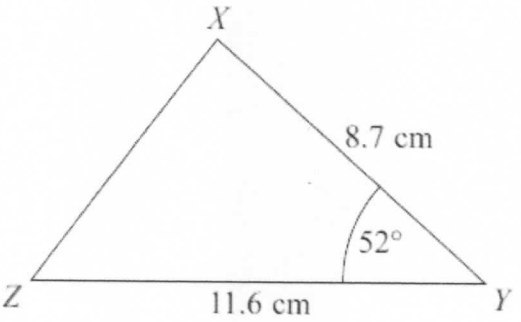
$R_2 = 1.2 \times 205 - 35 = 211$

$R_3 = 1.2 \times 211 - 35 = 218.2$

218

(Total 3 marks)

17.



In the triangle XYZ

$XY = 8.7$ cm,
$YZ = 11.6$ cm,
Angle $XYZ = 52°$

(a) Work out the area of triangle XYZ.
Give your answer correct to 3 significant figures.

Area $= \frac{1}{2} \times z \sin Y = \frac{1}{2} \times 11.6 \times 8.7 \times \sin 52°$

$= 39.763$

39.8
..... cm^2
to 3 s.f. **(2)**

(b) Work out the length of XZ.
Give your answer correct to 3 significant figures.

$XZ^2 = 11.6^2 + 8.7^2 - 2 \times 11.6 \times 8.7 \times \cos 52°$

$XZ^2 = 85.9849$

$XZ = \sqrt{85.9849}$

$XZ = 9.2728$

9.27
..... cm
to 3 s.f. **(3)**

(Total 5 marks)

18.

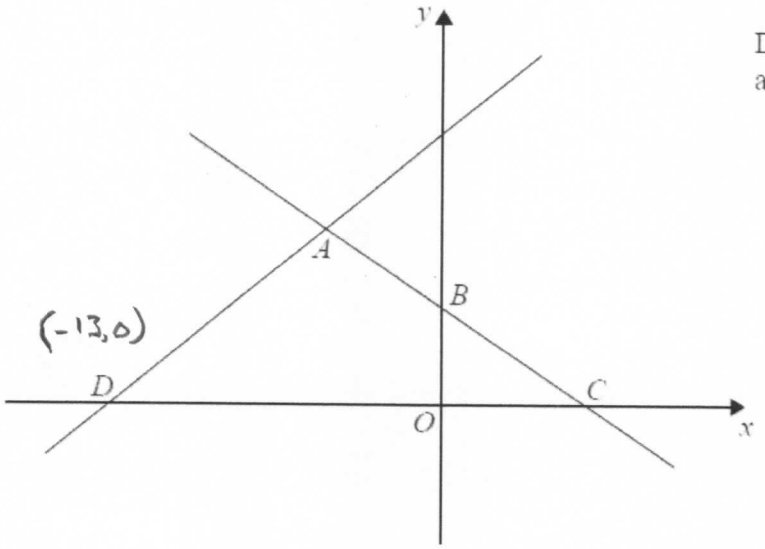


Diagram **NOT** accurately drawn

In the diagram, ABC is the line with equation $y = -\frac{1}{2}x + 5$

$AB = BC$
D is the point with coordinates (–13, 0).

Find an equation of the line through A and D.

Find coords of B and C

when $x = 0$ $\quad y = -\frac{1}{2}(0) + 5 = 5$ $\quad$ so $B(0, 5)$

when $y = 0$ $\quad 0 = -\frac{1}{2}x + 5$

$\frac{1}{2}x = 5$ $\quad$ so $C(10, 0)$

$x = 10$

since $AB = BC$ $\quad$ change in coords from C to B

= change in coords from B to A so $A(-10, 10)$

Gradient of AD $= \frac{10-0}{-10--13} = \frac{10}{-10+13} = \frac{10}{3}$

Using $y - y_1 = m(x - x_1)$ for line with gradient $\frac{10}{3}$ through $(-13, 0)$

$y - 0 = \frac{10}{3}(x - -13)$

$y = \frac{10}{3}(x + 13)$

$y = \frac{10}{3}x + \frac{130}{3}$

$y = \frac{10}{3}x + \frac{130}{3}$

.....

(Total 5 marks)

or $3y = 10x + 130$

$10x - 3y + 130 = 0$

19. h is inversely proportional to the square of r.

When $r = 5$, $h = 3.4$.

Find the value of h when $r = 8$.

$h = \frac{k}{r^2}$

$3.4 = \frac{k}{5^2}$

$3.4 \times 25 = k$

$85 = k$

$h = \frac{85}{r^2}$

when $r = 8$

$h = \frac{85}{8^2}$

$h = \frac{85}{64} = 1.33$ to 3 s.f

$h =$ 1.33

(Total 3 marks)

20. Solve $\frac{4}{x+3} + \frac{3}{2x-1} = 1$

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

$$4(2x-1) + 3(x+3) = 2x^2 + 6x - x - 3$$

$$8x - 4 + 3x + 9 = 2x^2 + 5x - 3$$

$$11x + 5 = 2x^2 + 5x - 3$$

$$0 = 2x^2 + 5x - 3 - 11x - 5$$

$$0 = 2x^2 - 6x - 8$$

$$0 = x^2 - 3x - 4$$

$$0 = (x+1)(x-4)$$

$\Rightarrow$ either $x + 1 = 0$ or $x - 4 = 0$

$x = -1$ $\quad$ $x = 4$

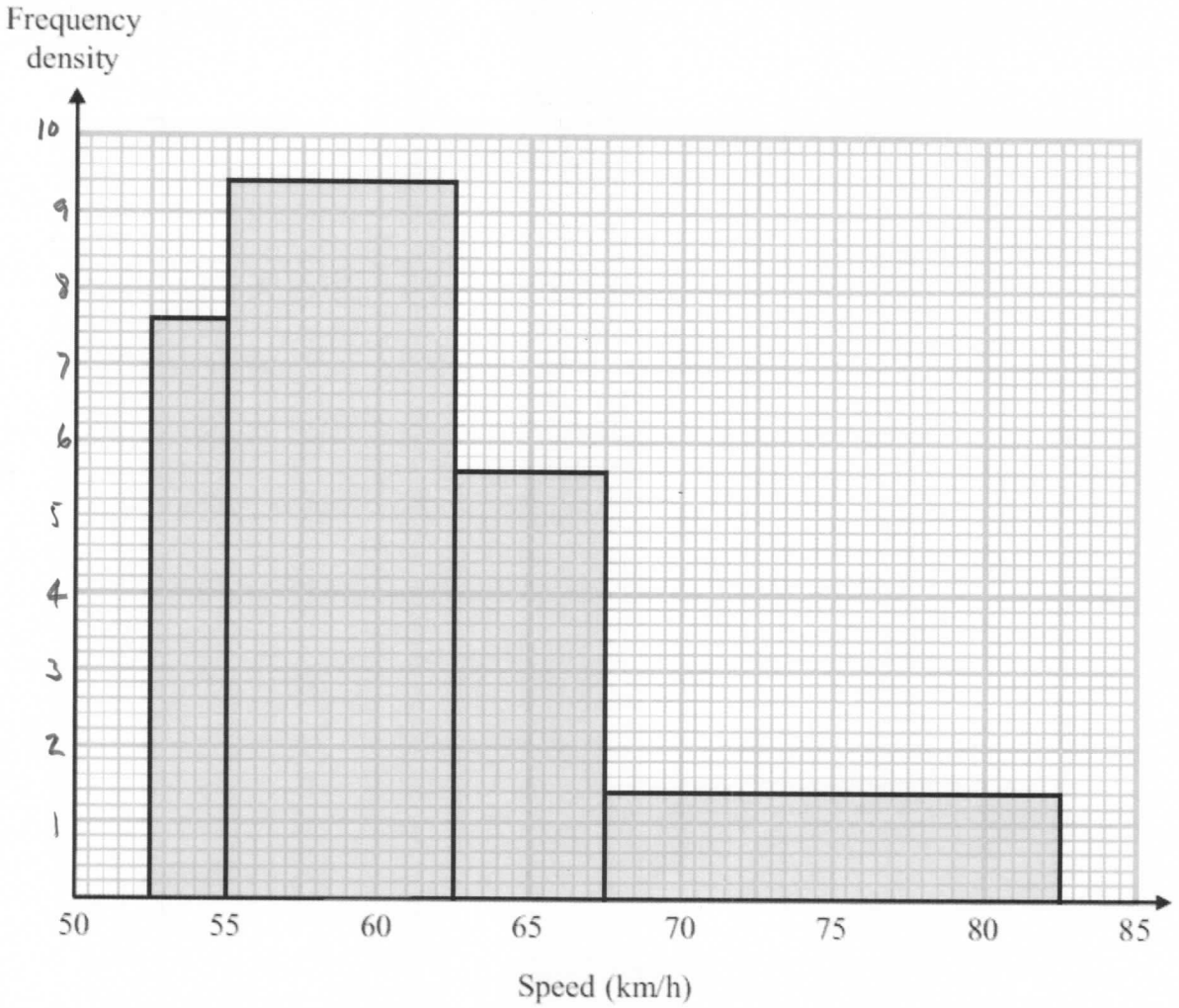
$x = -1$

$x = 4$

.....

(Total 5 marks)

21. The histogram gives information about the speeds, in km/h, of some cars on a road.



Work out an estimate for the median speed.

Give your answer correct to 1 decimal place.
You must show your working.

Total Area = Total Frequency

$2.5 \times 7.6 = 19$

$7.5 \times 9.4 = 70.5$

$5 \times 5.6 = 28$

$15 \times 1.4 = 21$

138.5

Halfway through area = 69.25

= first 19 then 50 through the 70 bar

so $55 + \frac{5}{7} \times 7.5$ (because 70 bar is 7.5 wide)

$= 60.357$

60.4

..... km/h

(Total 4 marks)

TOTAL FOR PAPER IS 80 MARKS