edexcel

GCSE Mathematics Practice Tests: Set 5

Paper 3H (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

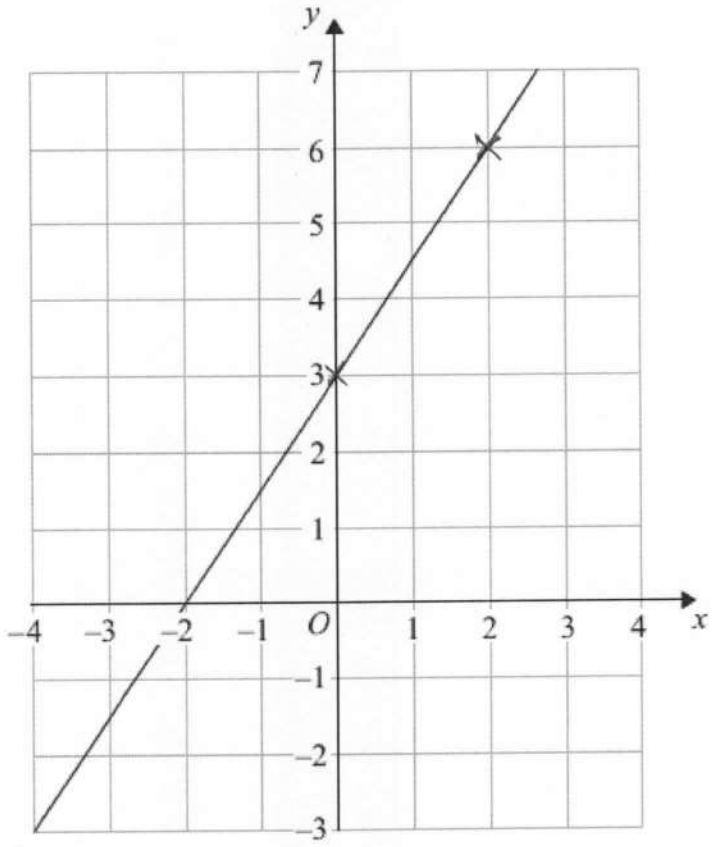
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1.



Find the gradient of the straight line drawn on this grid.

Two points on line are (0, 3) and (2, 6)

$$\text{gradient} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-3}{2-0} = \frac{3}{2}$$

$\frac{3}{2}$

.....

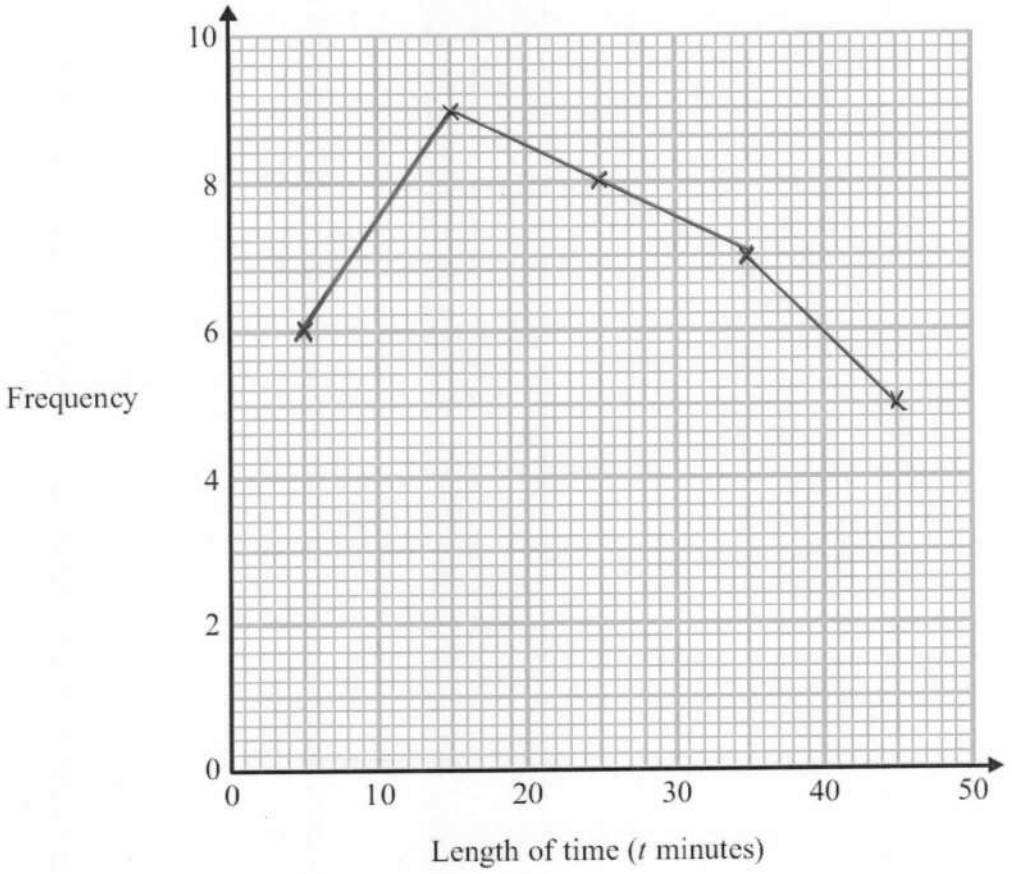
(Total 2 marks)

2. Helen went on 35 flights in a hot air balloon last year.

The table gives some information about the length of time, t minutes, of each flight.

Length of time (t minutes)	Frequency
$0 < t \leq 10$	6
$10 < t \leq 20$	9
$20 < t \leq 30$	8
$30 < t \leq 40$	7
$40 < t \leq 50$	5

On the grid below, draw a frequency polygon for this information.



(Total 2 marks)

*3. Henry is thinking about having a water meter.

These are the two ways he can pay for the water he uses.

Water Meter

A charge of £28.20 per year

plus

91.22p for every cubic metre of water used

1 cubic metre = 1000 litres

No Water Meter

A charge of £107 per year

Henry uses an average of 180 litres of water each day.

Henry wants to pay as little as possible for the water he uses.
Should Henry have a water meter?

180 x 365 = 65 700 litres per year

= 65.7 cubic metres

Total cost = £28.20 + 65.7 x 0.9122

= £88.13

This is less than £107 so cheaper for Henry to have a water meter. So yes have a meter.

(Total 5 marks)

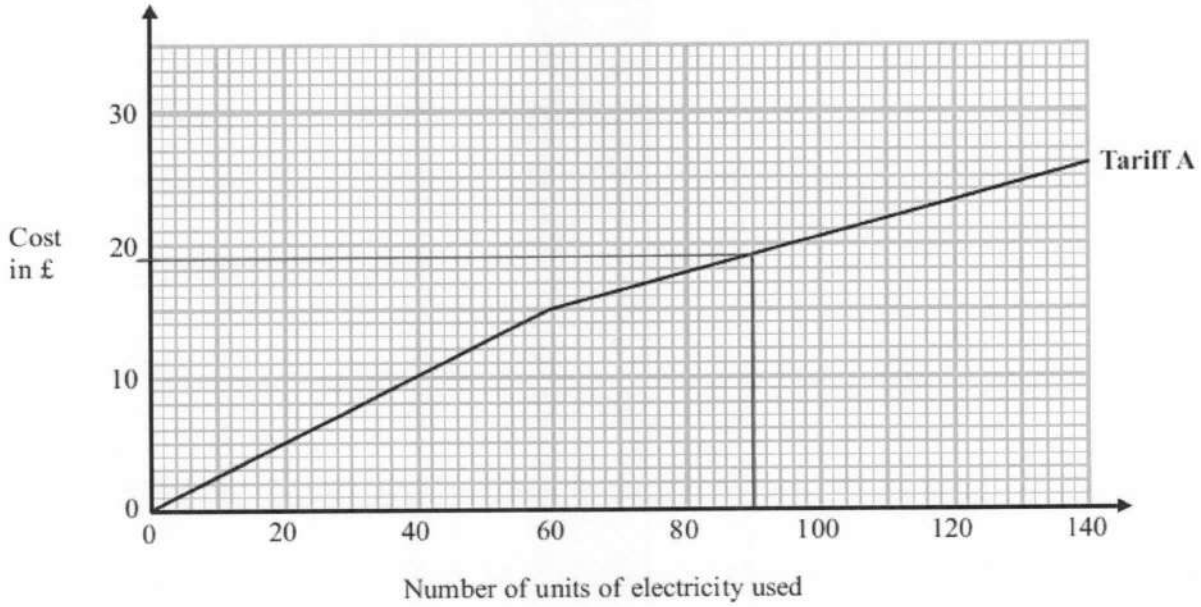
4. Kalinda pays on Tariff A for the number of units of electricity she uses.
Kalinda can use this graph to find out how much she pays each month.

(a) How much does Kalinda pay for each unit of electricity she uses up to a total of 60 units?

$\frac{\text{Total cost}}{\text{Units used}} = \frac{£15.00}{60} = £0.25$

25 ..... p

(2)



Kalinda could change to Tariff B.
Here is the monthly charge for Tariff B.

20p per unit of electricity used

On average, Kalinda uses 90 units of electricity each month.
Kalinda wants to pay the least amount of money for the units of electricity she uses.

*(b) Should Kalinda change to Tariff B? Tariff A costs £19.00
You must show all your working.

$90 \times £0.20 = £18.00$ for Tariff B

Switch to Tariff B since £1 per month cheaper

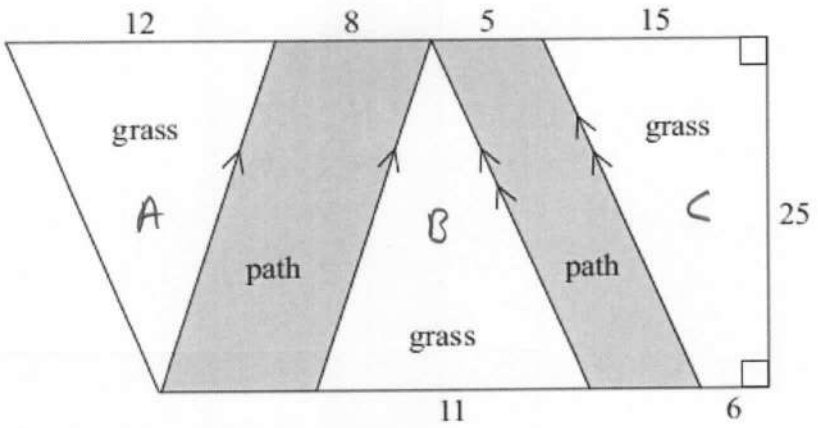
(3)

(Total 5 marks)

5. David is planning his garden.

There will be two paths in the garden.
The rest of the garden will be grass.

The diagram shows David's plan for his garden.



All measurements on the diagram are given in feet.
Work out the total area of the grass.

Area of A = $\frac{1}{2} \times 12 \times 25 = 150$ ft^2

Area of B = $\frac{1}{2} \times 11 \times 25 = 137.5$ ft^2

Area of C = $\frac{1}{2}(6+15) \times 25 = 262.5$ ft^2

Total area of grass 550 ft^2

550 ft^2

(Total 4 marks)

6. (a) Simplify $p^5 \times p^4$

$= p^{5+4}$

p^9

(1)

(b) Simplify $q^5 \div q^2$

$= q^{5-2}$

q^3

(1)

(c) Simplify $12tu^6 \div 6tu^5$

$2u$

(2)

(d) Simplify $(9w^2y^6)^{\frac{1}{2}}$

$3wy^3$

(2)

(e) For $x > 1$, write the following expressions in order of size.
Start with the expression with the least value.

x^0 x^2 x x^{-2} $x^{\frac{1}{2}}$

x^{-2} x^0 $x^{\frac{1}{2}}$ x x^2

(2)

(Total 8 marks)

7. Here are three cubes.

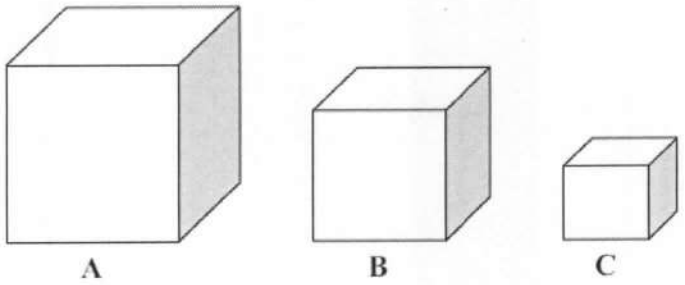


Diagram **NOT** accurately drawn

The volume of cube **B** is 20% less than the volume of cube **A**.
The volume of cube **C** is 20% less than the volume of cube **B**.

Cube **A** has a volume of 8000 cm^3.

What is the volume of cube **C** as a percentage of the volume of cube **A**?

$B = A \times 0.8$

$C = B \times 0.8 = A \times 0.8 \times 0.8$

$= A \times 0.64$

so C is 64% of A

(Total 4 marks)

8. In a sale, normal prices are reduced by 15%.

Janice buys a computer in the sale.
She pays £578.

Work out what the normal price of the computer was.

Normal $\times$ 0.85 = Sale Price

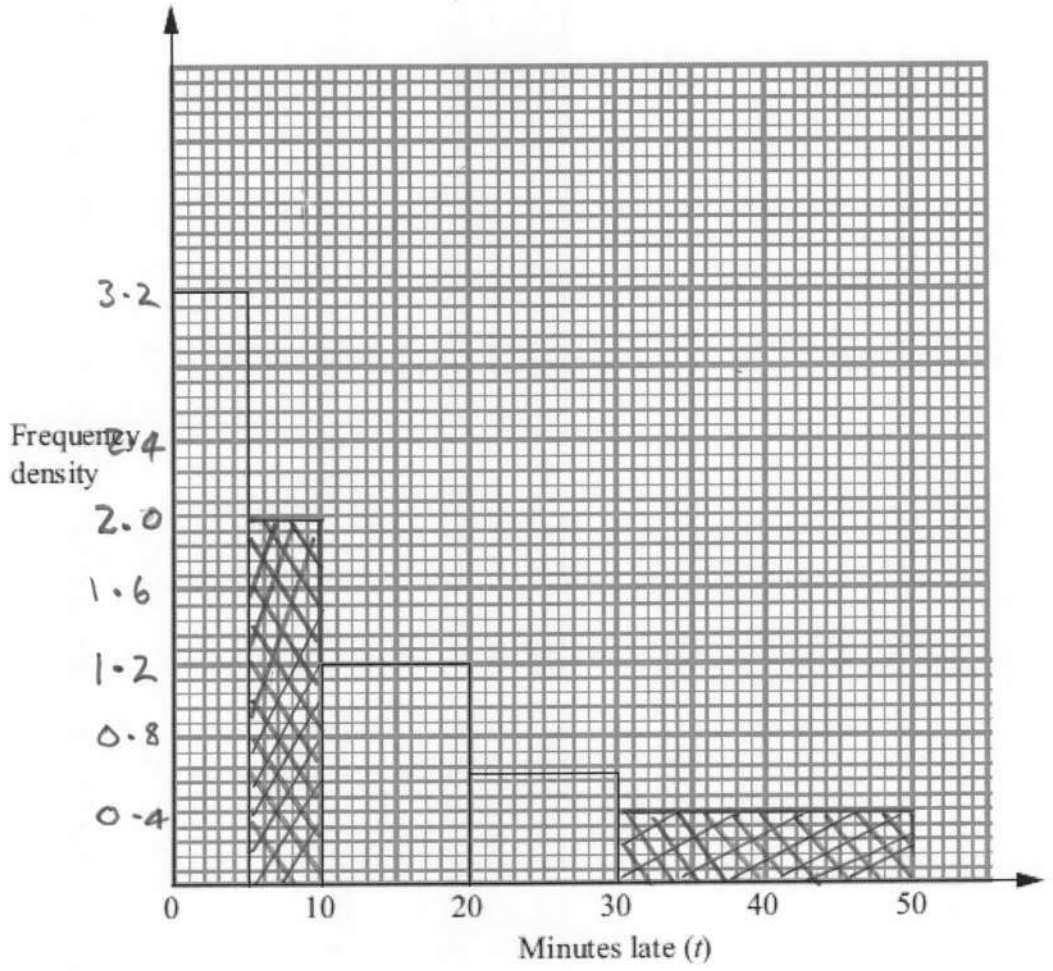
$$\text{Normal} = \frac{\text{Sale Price}}{0.85} = \frac{578}{0.85} = £680$$

£ 680

(Total 3 marks)

9. Some trains from Manchester to London were late.
The incomplete table and histogram gives some information about how late the trains were.

Minutes late (t)	Frequency	FD
$0 < t \leq 5$	16	$\frac{16}{5} = 3.2$
$5 < t \leq 10$	10	$\frac{10}{5} = 2$
$10 < t \leq 20$	$1.2 \times 10 = 12$	
$20 < t \leq 30$	$0.6 \times 10 = 6$	
$30 < t \leq 50$	8	$\frac{8}{20} = 0.4$



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

(2)

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

(2)

(Total 4 marks)

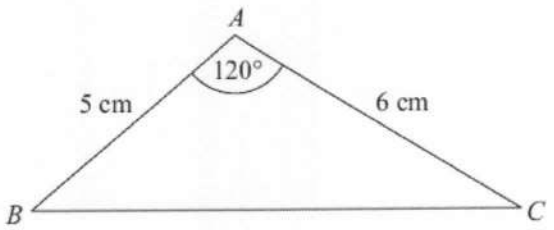
10. Make x the subject of $y = \sqrt{\dfrac{2x+1}{x-1}}$.

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

.....

(Total 4 marks)

11.



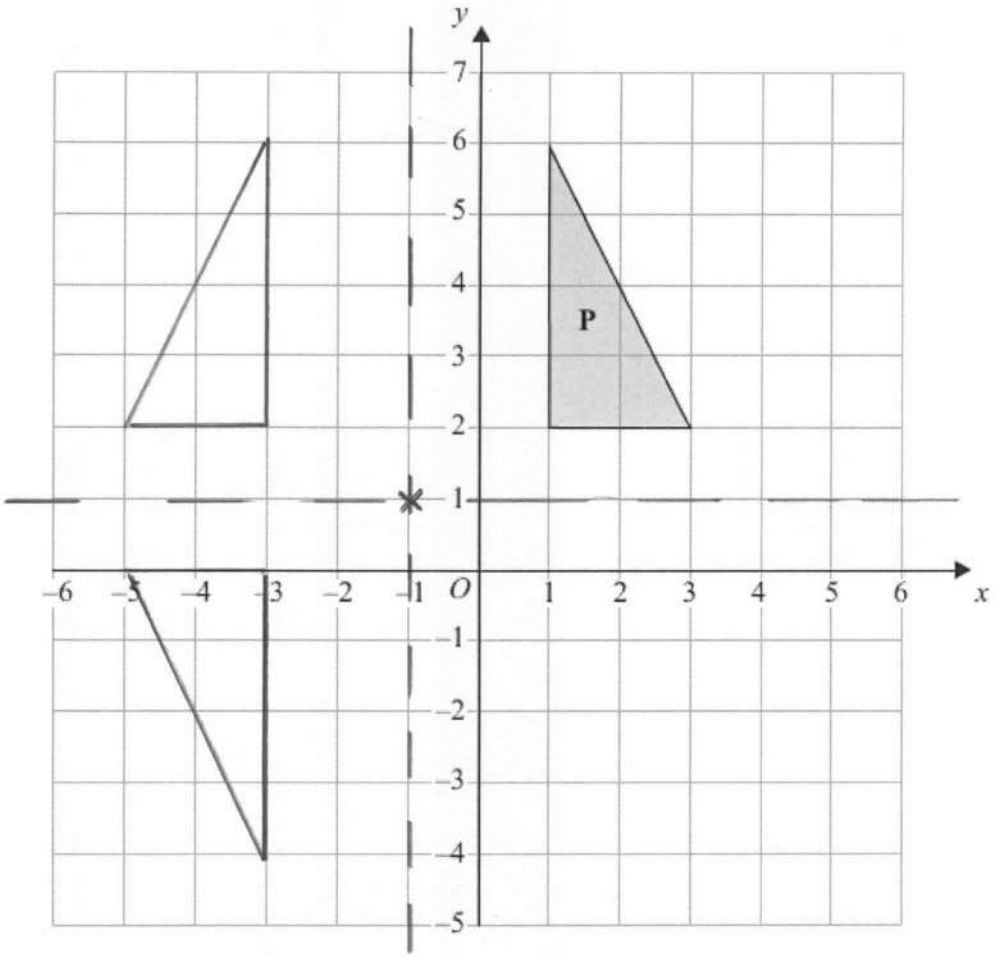
Calculate the length of the side BC.
Give your answer correct to 3 significant figures.

$$BC^2 = 5^2 + 6^2 - 2 \times 5 \times 6 \cos 120^\circ$$
$$BC^2 = 91$$
$$BC = \sqrt{91}$$
$$BC = 9.539$$
$$BC = 9.54 \text{ cm to 3 s.f}$$

9.54 ..... cm

(Total 3 marks)

12.



Triangle **P** is drawn on a coordinate grid.

The triangle **P** is reflected in the line $x = -1$ and then reflected in the line $y = 1$ to give triangle **Q**.

Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

Rotation by 180° about point (−1, 1)

.....

.....

(Total 3 marks)

13. A machine part is made by cutting a small square from the centre of a large square piece of steel.

The dimensions of the machine part are shown on the diagram.
All measurements are in cm.

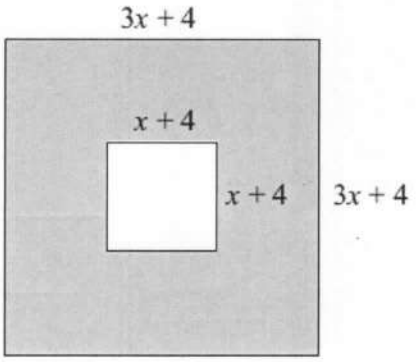


Diagram **NOT** accurately drawn

The perimeter of the small square is two thirds of the perimeter of the large square.

Work out the length of a side of the small square.

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

$\div 4$ $\quad x + 4 = \frac{2}{3}(3x+4)$

$3(x+4) = 2(3x+4)$

$3x + 12 = 6x + 8$

$12 - 8 = 6x - 3x$

$4 = 3x$

$\frac{4}{3} = x$

Side of small square $= x + 4$

$= \frac{4}{3} + 4$

$= 1\frac{1}{3} + 4$

$= 5\frac{1}{3}$

$5\frac{1}{3}$ ..... cm

(Total 5 marks)

14. F is inversely proportional to the square of x.
$F = 0.8$ when $x = 5$.

(*a*) Find a formula for F in terms of x.

$F = \frac{k}{x^2}$

$0.8 = \frac{k}{5^2}$

$0.8 \times 5^2 = k$

$20 = k$

$F = \frac{20}{x^2}$

$F = \frac{20}{x^2}$

(3)

(*b*) Work out the positive value of x when $F = 320$.

$320 = \frac{20}{x^2}$

$320x^2 = 20$

$x^2 = \frac{20}{320}$

$x^2 = \frac{1}{16}$

$x = \sqrt{\frac{1}{16}} = \pm\frac{1}{4}$

$x = \frac{1}{4}$

(2)

(Total 5 marks)

15. Here is a parallelogram.

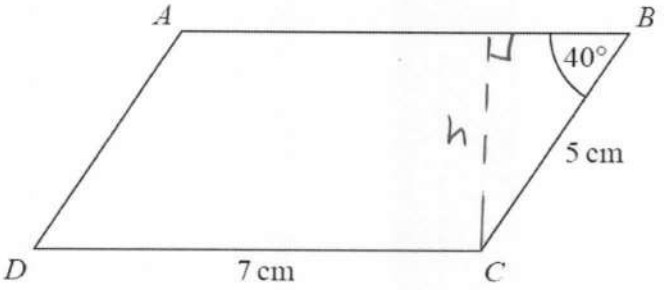


Diagram **NOT** accurately drawn

$\sin 40° = \frac{h}{5}$

$DC = 7$ cm
$CB = 5$ cm
Angle ABC is 40°

Height $h = 5 \sin 40°$

Work out the area of the parallelogram.
Give your answer correct to 1 decimal place.

Area = base × height

$= 7 \times 5 \sin 40°$

$= 22.4976$

$= 22.5 \text{ cm}^2$ to 1 d.p.

22.5 ..... cm^2

(Total 3 marks)

16. Clive wants to estimate the number of bees in a beehive.

Clive catches 50 bees from the beehive.
He marks each bee with a dye.
He then lets the bees go.

The next day, Clive catches 40 bees from the beehive.
8 of these bees have been marked with the dye.

(i) Work out an estimate for the number of bees in the beehive.

$40 \div 8 = 5$

$50 \times 5 = 250$

250 bees

(ii) Write down any assumptions you have made.

Dyed bees are mixed throughout population so second sample is a random sample

(Total 4 marks)

17. A new shopping centre is opened and 500 new jobs are created.
After 2 years, the number of jobs has increased to 700.

Assuming that the number of jobs in the shopping centre increases exponentially, work out how many jobs there will be 5 years after the shopping centre first opened.

$\frac{700}{500} = 1.4$

In two years 500 multiplied by 1.4

In 1 year multiplier is $\sqrt{1.4}$ or $1.4^{\frac{1}{2}}$

In 5 years multiplier is $1.4^{5/2}$

$500 \times 1.4^{5/2} = 1159.55$

≈ 1160

1160

(Total for 5 marks)

18. Write as a single fraction in its simplest form $\frac{2}{x-4} - \frac{1}{x+3}$

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

$$= \frac{2x + 6 - x + 4}{(x-4)(x+3)}$$

$$= \frac{x + 10}{(x-4)(x+3)}$$

.....

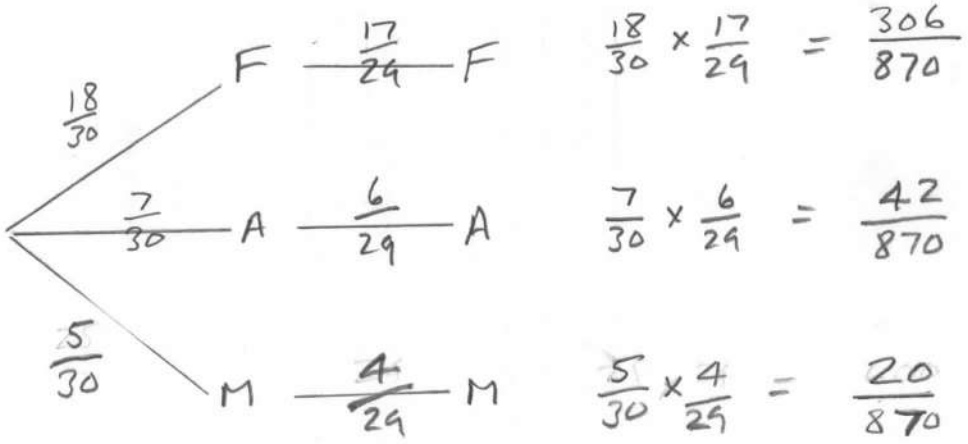
(Total 3 marks)

19. Nomusa has 30 sweets.

She has
- 18 fruit sweets
- 7 aniseed sweets
- 5 mint sweets

Nomusa is going to take at random two sweets.

Work out the probability that the two sweets will **not** be the same type of sweet.
You must show all your working.



$\frac{18}{30} \times \frac{17}{29} = \frac{306}{870}$

$\frac{7}{30} \times \frac{6}{29} = \frac{42}{870}$

$\frac{5}{30} \times \frac{4}{29} = \frac{20}{870}$

$\text{Prob}(2 \text{ Same}) = \text{Prob}(FF) + \text{Prob}(AA) + \text{Prob}(MM)$

$= \frac{306}{870} + \frac{42}{870} + \frac{20}{870} = \frac{368}{870}$

$\text{Prob}(2 \text{ not same}) = 1 - \text{Prob}(2 \text{ same})$

$= 1 - \frac{368}{870}$

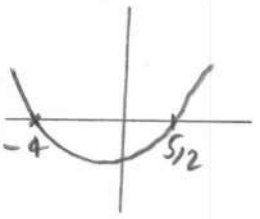
$= \frac{502}{870}$ or $\frac{251}{435}$ or 0.577

$\frac{502}{870}$

(Total 4 marks)

$y = 2x^2 + 3x - 20$

20. Solve the inequality $x(2x + 3) > 20$



$2x^2 + 3x > 20$

$2x^2 + 3x - 20 > 0$

$2x - 20$
$= -40$
$-5 + 8$

$2x^2 - 5x + 8x - 20 > 0$

$x(2x - 5) + 4(2x - 5) > 0$

$(x + 4)(2x - 5) > 0$

Either $x < -4$
or $x > 5/2$

.....

(Total 4 marks)

TOTAL FOR PAPER IS 80 MARKS