Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	5	4	0	H	/	3	H	Signature	

Paper Reference(s)

5540H/3H

Examiner's use only

Team Leader's use only

A* 80
A 68
B 52
C 36
D 20

Edexcel GCSE

Mathematics A (Linear) – 2540

Paper 3 (Non-Calculator)

Higher Tier

Thursday 6 November 2008 – Morning

Time: 1 hour 45 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Solutions

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 28 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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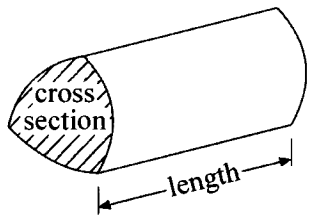
GCSE Mathematics (Linear) 2540

Formulae: Higher Tier

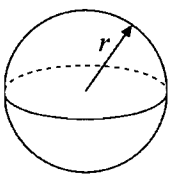
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



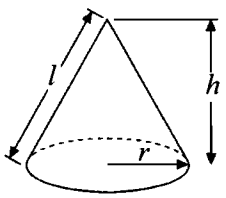
Volume of sphere $= \frac{4}{3}\pi r^3$

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

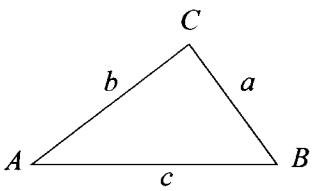


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle ABC



Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Leave blank

Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. (a) Simplify $5bc + 2bc - 4bc$

3bc

(1)

(b) Simplify $4x + 3y - 2x + 2y$

2x + 5y

(2)

(c) Simplify $m \times m \times m$

m^3

(1)

(d) Simplify $3n \times 2p$

6np

(1)

Q1

(Total 5 marks)

Leave blank

2. A tin of cat food costs 40p.
A shop has a special offer on the cat food.

Special offer

Pay for 2 tins and get 1 tin free

Buy 8 get 4 free

40 x 8 = 320p

Julie wants 12 tins of cat food.

(a) Work out how much she pays.

£ 3.20

(3)

The normal price of a cat basket is £20
In a sale, the price of the cat basket is reduced by 15%.

(b) Work out the sale price of the cat basket.

10% = £2
15% = £3
£20 - £3 = £17

£ 17

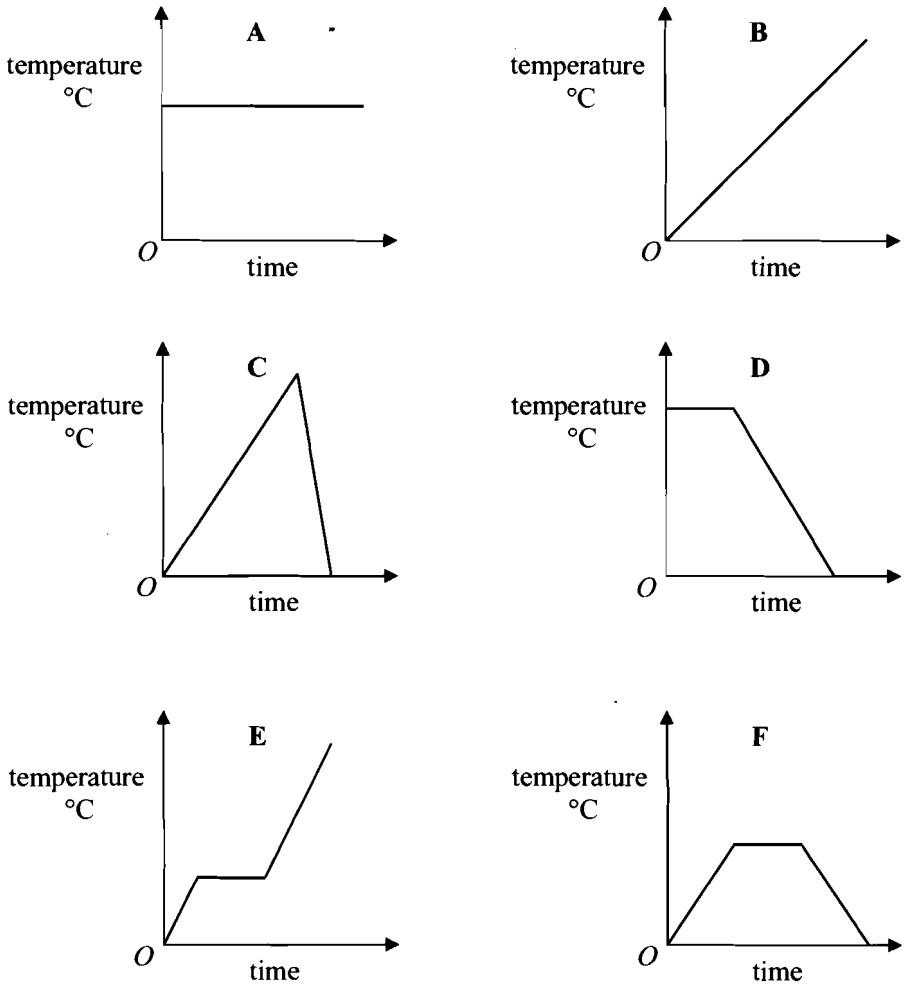
(3)

Q2

(Total 6 marks)

Leave blank

3. Here are six temperature/time graphs.



Each sentence in the table describes one of the graphs.
Write the letter of the correct graph next to each sentence.

The first one has been done for you.

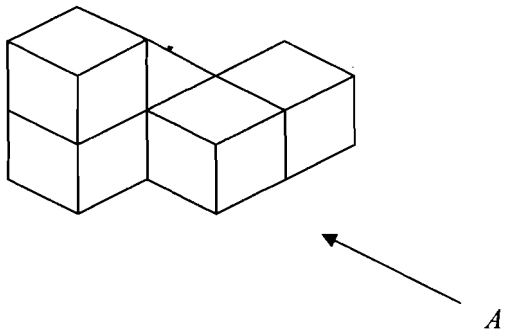
The temperature starts at 0°C and keeps rising.	**B**
The temperature stays the same for a time and then falls.	D
The temperature rises and then falls quickly.	C
The temperature is always the same.	A
The temperature rises, stays the same for a time and then falls.	F
The temperature rises, stays the same for a time and then rises again.	E

Q3

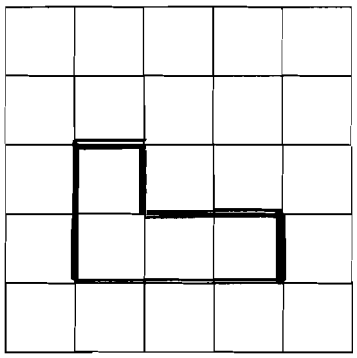
(Total 3 marks)

Leave blank

4. The diagram represents a solid made from 5 identical cubes.



On the grid below, draw the view of the solid from direction *A*.



Q4

(Total 2 marks)

Leave blank

5. Work out $\frac{2}{5}+\frac{1}{7}$ $= \frac{14+5}{35} = \frac{19}{35}$

$\frac{19}{35}$

Q5

(Total 2 marks)

6.

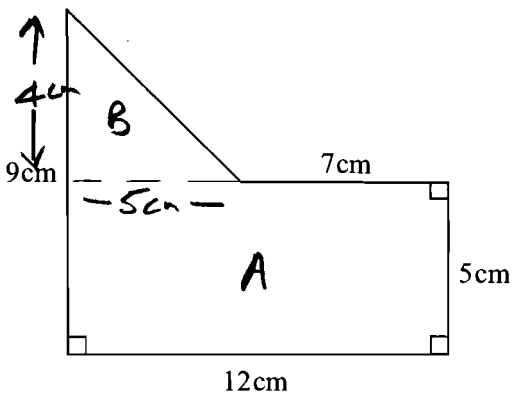


Diagram **NOT** accurately drawn

Work out the area of the shape.

$A = 12 \times 5 = 60$

$B = \frac{1}{2} \times 5 \times 4 = 10$

70 cm^2

70 cm^2

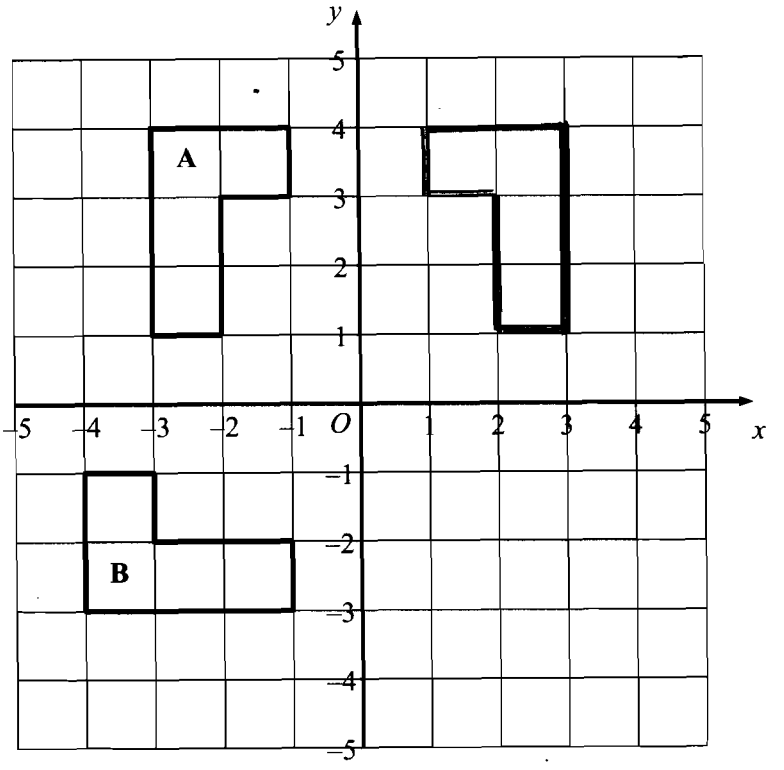
Q6

(Total 4 marks)

Turn over

Leave blank

7.



(a) Reflect shape **A** in the y axis.

(2)

(b) Describe fully the **single** transformation which takes shape **A** to shape **B**.

Rotation 90° anti-clockwise about (0, 0)

(3) Q7

(Total 5 marks)

Leave blank

8. Naomi wants to find out how often adults go to the cinema.

She uses this question on a questionnaire.

"How many times do you go to the cinema?"

☐ Not very often ☐ Sometimes ☐ A lot

(a) Write down **two** things wrong with this question.

1 No time-scale

2 Labels too vague or zero times not included

(2)

(b) Design a better question for her questionnaire to find out how often adults go to the cinema.
You should include some response boxes.

How many times did you go to the cinema last month?

0	1	2	3	>3

(2)

(Total 4 marks)

Q8

Leave blank

9. (a) Factorise $5m + 10$

$5(m+2)$

(1)

(b) Factorise $y^2 - 3y$

$y(y-3)$

(1) Q9

(Total 2 marks)

10. Sidra and Gemma share £48 in the ratio 5 : 3

Work out how much more money Sidra gets than Gemma gets.

$5 + 3 = 8$ shares

$\frac{48}{8} = £6 = 1$ share

Sidra $5 \times £6 = £30$

Gemma $3 \times £6 = £18$

Difference $£12$

£ 12 Q10

(Total 3 marks)

11.

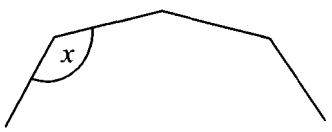


Diagram **NOT** accurately drawn

The diagram shows part of a **regular** 10-sided polygon.

Work out the size of the angle marked x.

Exterior angle $= \frac{360}{10} = 36°$

Interior $= 180° - 36° = 144°$

144 ° Q11

(Total 3 marks)

Leave blank

12.

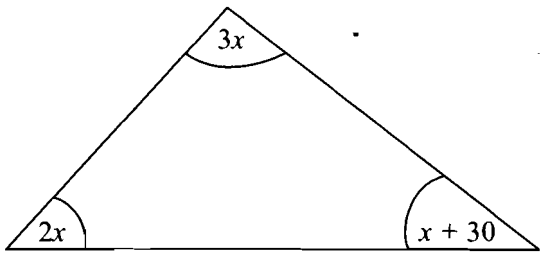


Diagram **NOT** accurately drawn

The diagram shows a triangle.
The sizes of the angles, in degrees, are

$3x$
$2x$
$x + 30$

Work out the value of x.

$3x + 2x + x + 30 = 180$

$6x + 30 = 180$

$6x = 180 - 30$

$6x = 150$

$x = 25$

$x =$ 25

(Total 3 marks)

Q12

13. $-2 < n \leqslant 4$
n is an integer.

(a) Write down all the possible values of n.

$-1, 0, 1, 2, 3, 4$

(2)

(b) Solve the inequality $6x - 3 < 9$

$6x < 9 + 3$

$6x < 12$

$x < \frac{12}{6}$

$x < 2$

$x < 2$

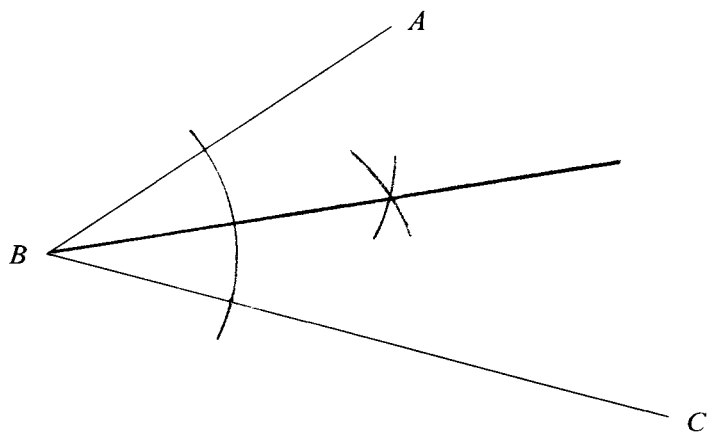
(2)

(Total 4 marks)

Q13

Leave blank

14. Use ruler and compasses to construct the bisector of angle ABC.
You must show all your construction lines.



Q14

(Total 2 marks)

15. (a) Express 84 as a product of its prime factors.

2 | 84
2 | 42
3 | 21
7 | 7
1

$2^2 \times 3 \times 7$

(3)

(b) Find the Highest Common Factor (HCF) of 84 and 35

$84 = 2 \times 2 \times 3 \times 7$
$35 = 5 \times 7$

HCF = 7

7

(2)

Q15

(Total 5 marks)

Leave blank

16. $v^2 = u^2 + 2as$

$u = 6$
$a = 2.5$
$s = 9$

(a) Work out a value of v.

$v^2 = 6^2 + 2 \times 2.5 \times 9$

$v^2 = 36 + 45$

$v^2 = 81$

$v = \sqrt{81}$

$v = \pm 9$

$v =$ ± 9

(3)

(b) Make s the subject of the formula $v^2 = u^2 + 2as$

$v^2 - u^2 = 2as$

$\frac{v^2 - u^2}{2a} = s$

$s =$ $\frac{v^2 - u^2}{2a}$

(2)

Q16

(Total 5 marks)

17. (a) Write the number 39 000 in standard form.

3.9×10^4

(1)

(b) Write 7.21×10^{-3} as an ordinary number.

0.00721

(1)

Q17

(Total 2 marks)

Leave blank

18. The table shows information about the amount spent by 100 customers in a supermarket.

Amount spent (£n)	Frequency
$0 < n \leqslant 20$	18
$20 < n \leqslant 40$	22
$40 < n \leqslant 60$	35
$60 < n \leqslant 80$	15
$80 < n \leqslant 100$	8
$100 < n \leqslant 120$	2

(a) Complete the cumulative frequency table for this information.

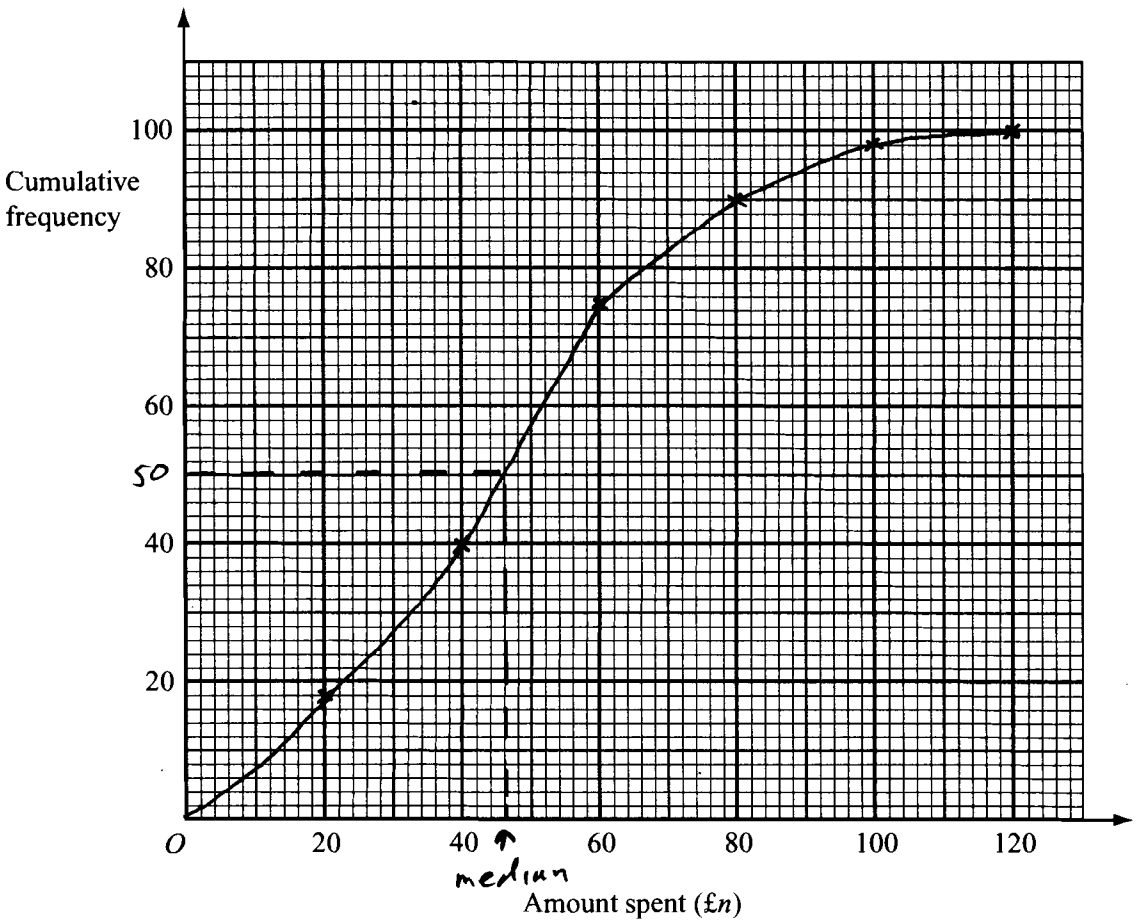
Amount spent (£n)	Cumulative frequency
$0 < n \leqslant 20$	18
$0 < n \leqslant 40$	40
$0 < n \leqslant 60$	75
$0 < n \leqslant 80$	90
$0 < n \leqslant 100$	98
$0 < n \leqslant 120$	100

(1)

(b) On the grid, draw a cumulative frequency graph for your table.

(2)

Leave blank



(c) Use your graph to find an estimate for the median amount spent.

£ 46

(1)

Q18

(Total 4 marks)

19. The table shows some expressions.
a, b, c and d represent lengths.
π and 2 are numbers that have no dimensions.

abc	$\frac{ab}{2}$	πbc	πd	$ab + cd$	$\pi(a + b)$	bc^2
	✓	✓		✓		

Three of the expressions could represent areas.

Tick (✓) the boxes underneath these three expressions.

Q19

(Total 3 marks)

Leave blank

20.

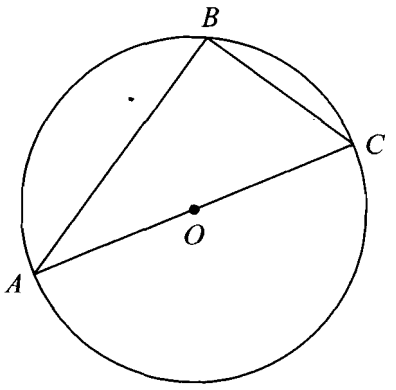


Diagram **NOT** accurately drawn

A, *B* and *C* are points on the circumference of a circle, centre *O*.
AC is a diameter of the circle.

(a) (i) Write down the size of angle *ABC*.

90 °

(ii) Give a reason for your answer.

∠ in a semi-circle = 90°

(2)

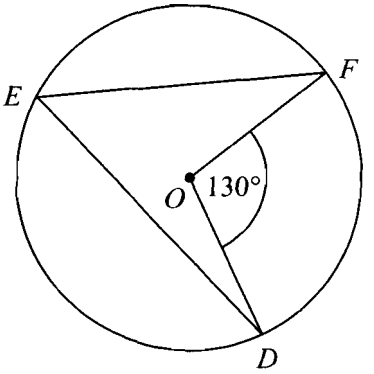


Diagram **NOT** accurately drawn

D, *E* and *F* are points on the circumference of a circle, centre *O*.
Angle *DOF* = 130°.

(b) (i) Work out the size of angle *DEF*.

65 °

(ii) Give a reason for your answer.

∠ subtended at centre is twice ∠ subtended at circumference

(2)

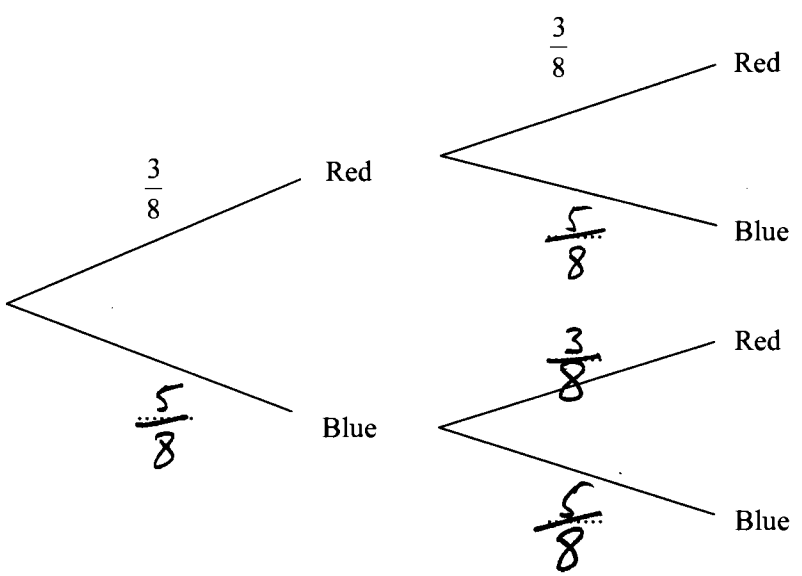
(Total 4 marks)

Q20

Leave blank

21. Matthew puts 3 red counters and 5 blue counters in a bag.
He takes at random a counter from the bag.
He writes down the colour of the counter.
He puts the counter in the bag again.
He then takes at random a second counter from the bag.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Matthew takes two red counters.

$\frac{9}{64}$

(2)

(Total 4 marks)

Q21

22. (a) Factorise fully $6x^2 + 9xy$

$3x(2x+3y)$

(2)

(b) Expand and simplify $(2x + 5)(x - 2)$

$2x^2+5x-4x-10$

$2x^2+x-10$

$2x^2+x-10$

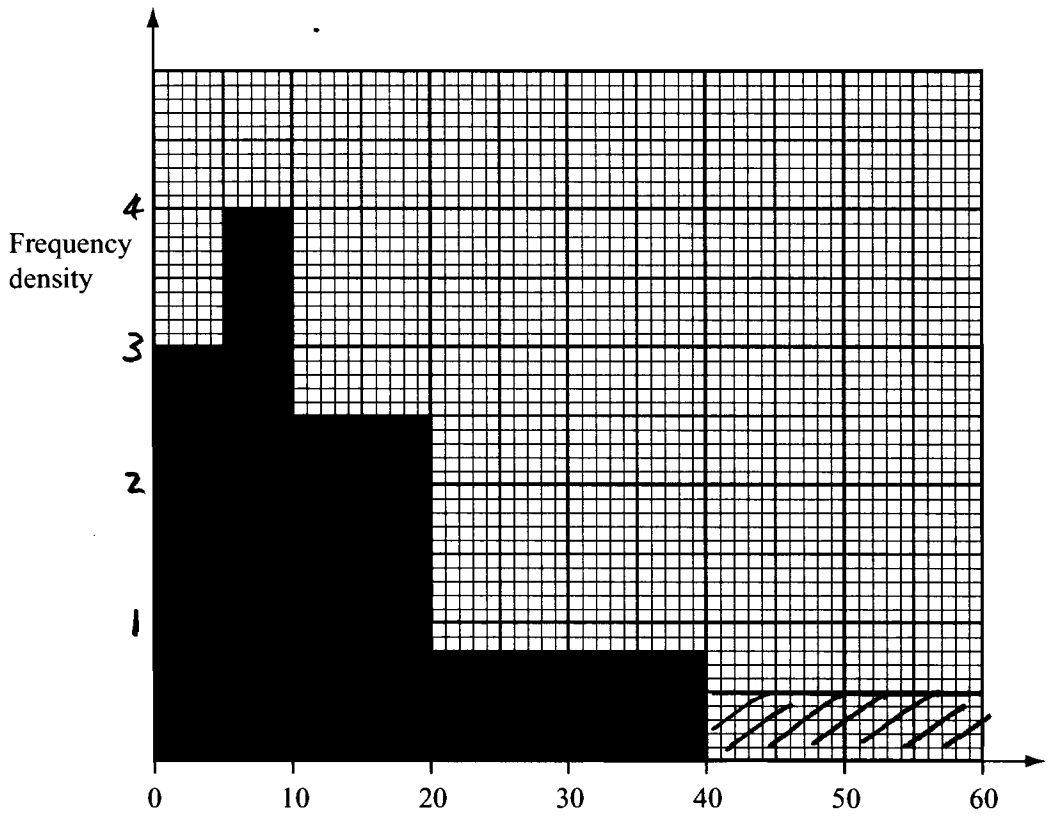
(2)

(Total 4 marks)

Q22

Leave blank

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



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

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

2·5 × 10

0·8 × 20

0·5 × 20

(2)

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

(1)

Q23

(Total 3 marks)

Leave blank

24. Express the recurring decimal $0.2\dot{1}\dot{3}$ as a fraction.

Let $x = 0.21313\ldots$

$100x = 21.31313\ldots$

$99x = 21.1$

$990x = 211$

$x = \frac{211}{990}$

$\frac{211}{990}$

(Total 3 marks)

Q24

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

7

(1)

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

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

$3\sqrt{5}$

(1)

(Total 2 marks)

Q25

Leave blank

26.

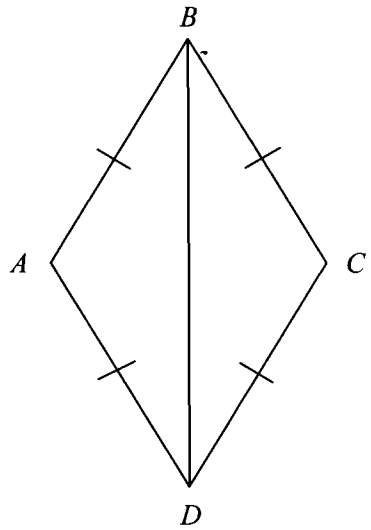


Diagram **NOT** accurately drawn

In the diagram, $AB = BC = CD = DA$.

Prove that triangle ADB is congruent to triangle CDB.

AD = DC equal sides
AB = BC equal sides
BD = BD common side

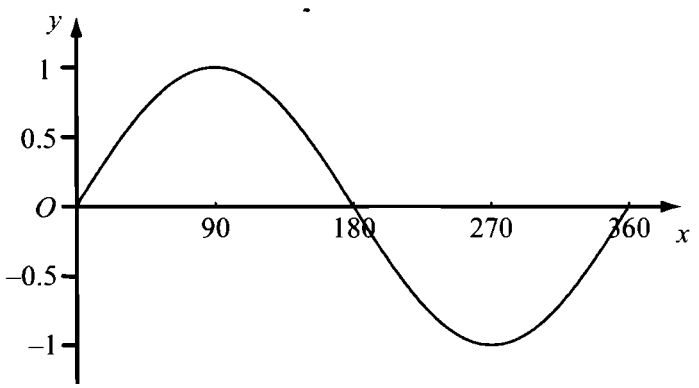
Concruent S.S.S.
(Δs ADB, CDB)

Q26

(Total 3 marks)

Leave blank

27. The diagram shows a sketch of the curve $y = \sin x°$ for $0 \leqslant x \leqslant 360$



The exact value of $\sin 60° = \frac{\sqrt{3}}{2}$

(a) Write down the exact value of

(i) $\sin 120°$,

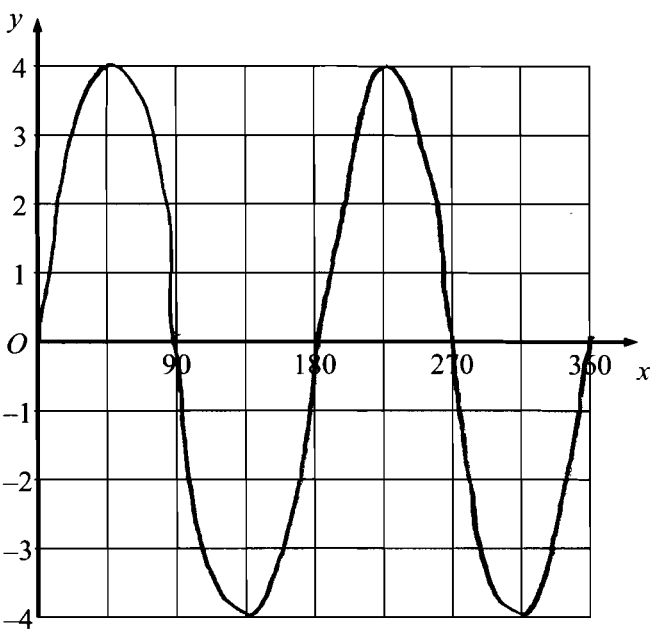
$\frac{\sqrt{3}}{2}$

(ii) $\sin 240°$.

$-\frac{\sqrt{3}}{2}$

(2)

(b) On the grid below, sketch the graph of $y = 4\sin 2x°$ for $0 \leqslant x \leqslant 360$



(2) **Q27**

(Total 4 marks)

Turn over

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28. Solve the simultaneous equations

$x^2 + y^2 = 5$ (1)

$y = 3x + 1$ (2)

Subst for y in (1)

$x^2 + (3x+1)^2 = 5$

$x^2 + 9x^2 + 6x + 1 = 5$

$10x^2 + 6x - 4 = 0$

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

$(5x - 2)(x + 1) = 0$

Either $5x - 2 = 0$ or $x = -1$

$5x = 2$

$x = \frac{2}{5}$

when $x = \frac{2}{5}$

$y = 3 \times \frac{2}{5} + 1$

$y = \frac{6}{5} + 1$

$y = \frac{11}{5}$

when $x = -1$

$y = 3(-1) + 1$

$y = -3 + 1$

$y = -2$

$x = \frac{2}{5}$ $y = \frac{11}{5}$

or $x = -1$ $y = -2$

Q28

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END