Write your name here

Surname | Other names

Centre Number | Candidate Number

Edexcel GCSE

Mathematics B

Unit 2: Number, Algebra, Geometry 1 (Non-Calculator)

Higher Tier

Tuesday 21 June 2011 – Morning
Time: 1 hour 15 minutes

Paper Reference
5MB2H/01

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

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 must not be used.**

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

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.

Turn over ▶

P38981A

6/6/6/6

P 3 8 9 8 1 A 0 1 1 6

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1

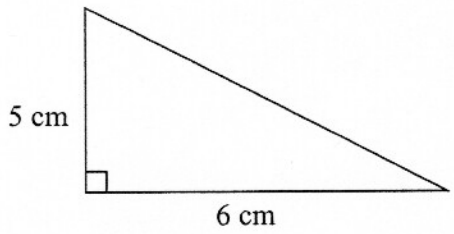


Diagram **NOT** accurately drawn

Work out the area of this triangle.

$\frac{w \times h}{2} = \frac{6 \times 5}{2} = \frac{30}{2} = 15 \text{ cm}^2$

[1] [1] [1]

.....

(Total for Question 1 is 3 marks)

2 (a) Simplify $3y + 2x - 4 + 5x + 7$

$= 7x + 3y + 3$

(1)

(b) Factorise $2x^2 - 4x$

$= 2x(x - 2)$

[1] [1]

(2)

(c) Expand and simplify $11 - 3(x+2)$

$= 11 - 3x - 6$ — [1]

$= 5 - 3x$ — [1]

(2)

(d) Expand and simplify $(x-6)(3x+7)$

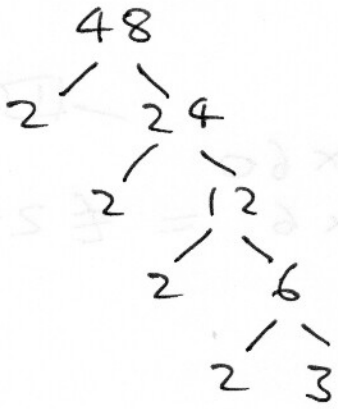
$= 3x^2 + 7x - 18x - 42$ — [1] (even if +/- mistake or 3 numbers ok).

$= 3x^2 - 11x - 42$ — [1]

(2)

(Total for Question 2 is 7 marks)

3 (a) Express 48 as a product of its prime factors.



— 1

$48 = 2^4 \times 3$ } — 1
(or $2 \times 2 \times 2 \times 2 \times 3$). (2) }

Buses to Exeter leave a bus station every 20 minutes.
Buses to Plymouth leave the bus station every 16 minutes.
A bus to Exeter and a bus to Plymouth both leave the bus station at 8am.

(b) When will buses to Exeter and to Plymouth next leave the bus station at the same time?

1 — To Plymouth: 16 32 48 64 80
To Exeter 20 40 60 80 — 1

80 minutes after 8 am
= 9:20 am — 1

[or LCM of 16 and 20
$= \frac{16 \times 20}{4} = 4 \times 20 = 80$
HCF]

(3)

(Total for Question 3 is 5 marks)

4 Lydia is buying a ring.
The ring costs £60
She pays a deposit of 40%.

Work out how much she pays as the deposit.

(1)

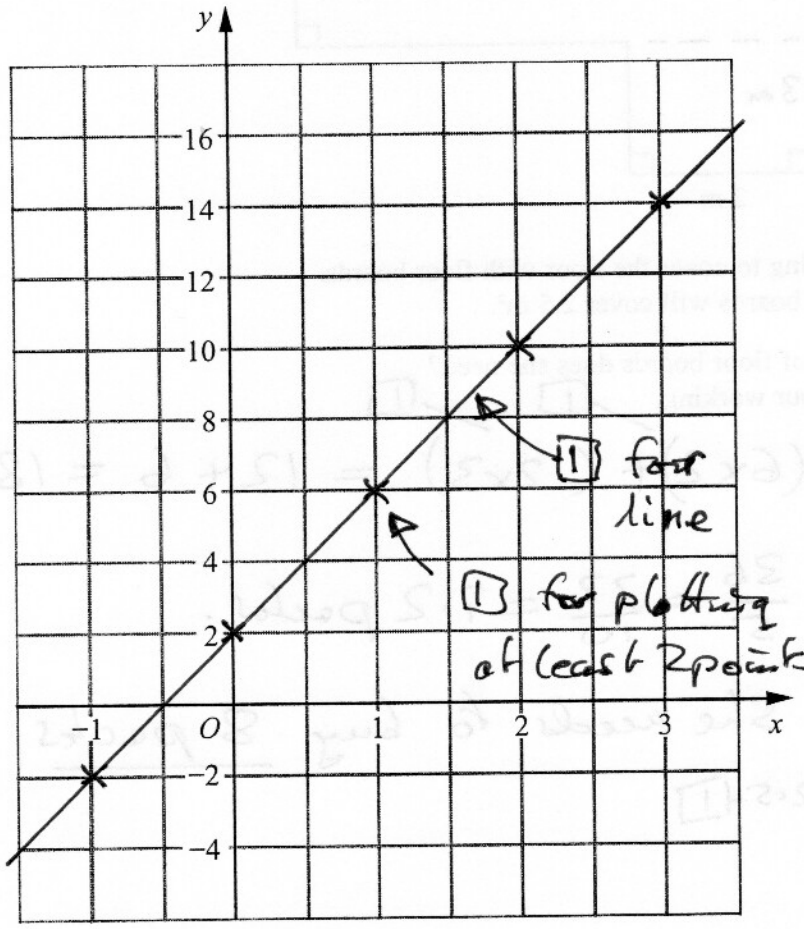
40% of £60 = 0.4 × 60
= 4 × 6 = £24

(1)

£ 24

(Total for Question 4 is 2 marks)

5 (a) On the grid, draw the graph of $y = 4x + 2$ from $x = -1$ to $x = 3$



x	y
−1	−2
0	2
1	6
2	10
3	14

[1] if at least 2 y-values ok.

[1] for line

[1] for plotting at least 2 points ok.

(3)

(b) (i) Write down the equation of a straight line that is parallel to $y = 4x + 2$

(anything like $y = 4x$, $4x + 1$, $4x +$ anything). $y = 4x$

(ii) Write down the gradient of a straight line that is perpendicular to $y = 4x + 2$

$y = 4x + 2$

" $y = mx + c$ " $\Rightarrow m = 4$,

perpendicular gradient $\frac{-1}{m} = -\frac{1}{4}$ [1]

(2)

(Total for Question 5 is 5 marks)

***6** The diagram shows the plan of Mrs Phillips' living room.

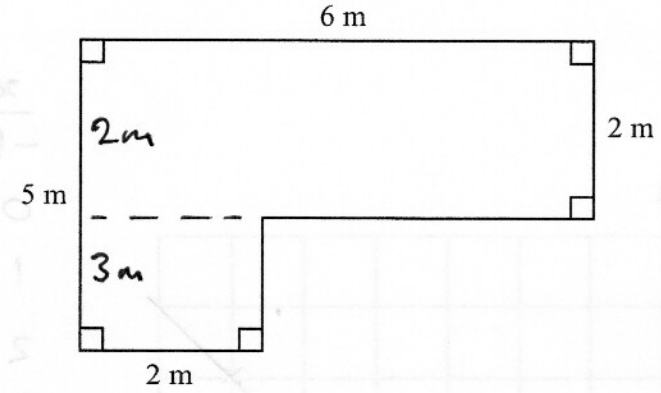


Diagram **NOT** accurately drawn

Mrs Phillips is going to cover the floor with floor boards.
One pack of floor boards will cover 2.5 m^2.

How many packs of floor boards does she need?
You must show your working.

[1] [1]

Area $= (6 \times 2) + (2 \times 3) = 12 + 6 = 18\ m^2$

$\frac{18}{2.5} = \frac{36}{5} = \frac{72}{10} = 7.2$ packs.

She needs to buy 8 packs [1]

Division by 2.5 [1]

(Total for Question 6 is 4 marks)

7 The point A has coordinates (3, 8).
The point B has coordinates (7, 5).
M is the midpoint of the line segment AB.

Find the coordinates of M.

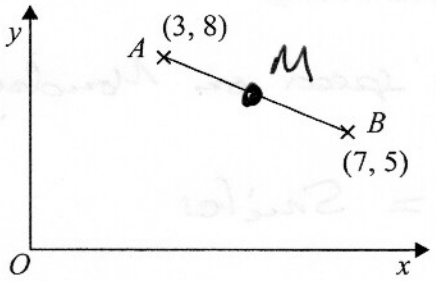


Diagram **NOT** accurately drawn

$\left(\frac{3+7}{2}, \frac{8+5}{2}\right) = \left(\frac{10}{2}, \frac{13}{2}\right)$ — 1

$= \left(5, 6\frac{1}{2}\right)$ — 1

.....

(Total for Question 7 is 2 marks)

8 (a) Simplify $p^3 \times p^5$

p^8

.....

(1)

(b) Simplify $\frac{h^7}{h^2}$

h^5

.....

(1)

(c) Simplify $(x^2)^3$

x^6

.....

(1)

(Total for Question 8 is 3 marks)

*9 Mr Smith drives 24 miles to work.

On Monday his journey to work takes 30 minutes.
On Tuesday the average speed of his journey to work is 56 km/h.

Did Mr Smith drive more quickly to work on Monday or on Tuesday?
You must show all your working.

Average speed on Monday = $\frac{24 \text{ miles}}{\frac{1}{2} \text{ hour}}$ = 48 mph [1]

8 km = 5 miles

Tuesday's average speed = 56 km/h
= 7 × 8 km/h
= 7 × 5 miles/hour } convert units [1]
= 35 mph. [1]

Monday's journey is faster. [1]

(Total for Question 9 is 4 marks)

10 Here are the first 5 terms of an arithmetic sequence.

6 10 14 18 22
+4 +4 +4 +4

(a) Write down an expression, in terms of n, for the nth term of this sequence.

[1] [1]

$4n + 2$

(2)

The nth term of a different sequence is $2n^2 - 4$

(b) Find the 3rd term of this sequence.

$n = 3$

$2n^2 - 4 = 2 \times 3^2 - 4$ [1]

$= 2 \times 9 - 4$

$= 18 - 4 = 14$

[1]

14

(2)

(Total for Question 10 is 4 marks)

11

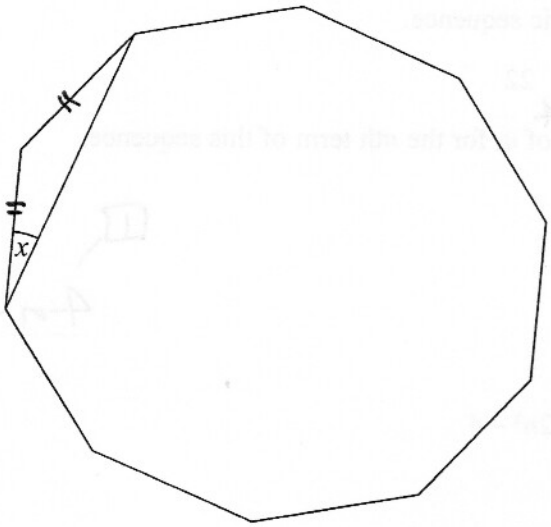
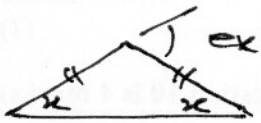


Diagram **NOT** accurately drawn

The diagram shows a regular decagon.

Work out the size of angle x.

10 sides



isosceles triangle.

exterior angle $= 2x$ [1]

$= \frac{360^\circ}{10} = 36^\circ$ [1]

$\therefore x = \frac{36}{2} = 18^\circ$ [1] [1]

18 °

(Total for Question 11 is 4 marks)

12 Prove that $(n-1)^2 + n^2 + (n+1)^2 = 3n^2 + 2$

$(n-1)^2 = (n-1)(n-1) = n^2 - n - n + 1 = n^2 - 2n + 1$ [1]

$(n+1)^2 = n^2 + 2n + 1$

$(n-1)^2 + n^2 + (n+1)^2 = n^2 - 2n + 1 + n^2 + n^2 + 2n + 1$

$= 3n^2 + 2$. [1]

(Total for Question 12 is 2 marks)

***13**

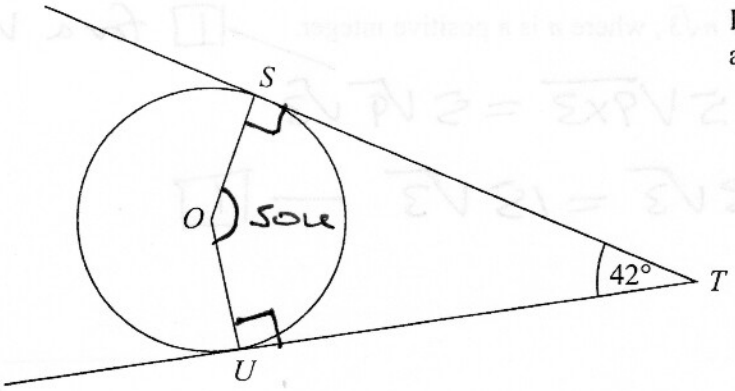


Diagram **NOT** accurately drawn

S and *U* are points on the circumference of a circle, centre *O*.
ST and *UT* are tangents to the circle.
Angle *STU* = 42°

Work out the size of angle *SOU*.
Give reasons for your answer.

[1]

Tangent ST is perpendicular to radius SO (and UT ⊥ to UO).

Angles in a quadrilateral add to 360° — [1]

$\angle SOU + 90 + 90 + 42 = 360$

$\angle SOU = 360 - 180 - 42 = 138°$ — [1]

(Total for Question 13 is 3 marks)

14 (a) Express $5\sqrt{27}$ in the form $n\sqrt{3}$, where n is a positive integer.

1 for a $\sqrt{9}$

$5\sqrt{27} = 5\sqrt{9\times3} = 5\sqrt{9}\sqrt{3}$

$= 5\times3\sqrt{3} = 15\sqrt{3}$ — 1

.....

(2)

(b) Rationalise the denominator of $\frac{21}{\sqrt{3}}$

$\frac{21}{\sqrt{3}} = \frac{21\sqrt{3}}{\sqrt{3}\times\sqrt{3}} = \frac{21\sqrt{3}}{3} = 7\sqrt{3}$

$\times\sqrt{3}$ (1) $\times\sqrt{3}$ (1)

.....

(2)

(Total for Question 14 is 4 marks)

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15 (a) Write down the value of $27^{\frac{1}{3}}$

$27^{\frac{1}{3}} = \sqrt[3]{27} = 3$ — 1

.....

(1)

(b) Find the value of $25^{-\frac{1}{2}}$

$25^{-1/2} = \frac{1}{25^{1/2}} = \frac{1}{5}$ — 1

.....

(2)

1

(Total for Question 15 is 3 marks)

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16 (a) Simplify $\dfrac{2y-12}{y^2-8y+12}$

$y^2-8y+12$,

factors of 12: 1×12, 2×6, 3×4, -1×-12, -2×-6, -3×-4

add to -8 ← -2×-6

$= \dfrac{2(y-6)}{(y-2)(y-6)}$ — [1] — [1]

$= \dfrac{2}{y-2}$ — [1]

.....

(3)

(b) Write as a single fraction $\dfrac{3}{x-4}-\dfrac{1}{x+5}$

$= \dfrac{3(x+5)-1(x-4)}{(x-4)(x+5)}$ — [1] if any part correct.

$\left(= \dfrac{3x+15-x+4}{(x-4)(x+5)} \right)$ — [1] if all correct.

$\left(= \dfrac{2x+19}{(x-4)(x+5)} \right)$

.....

(2)

(Total for Question 16 is 5 marks)

TOTAL FOR PAPER IS 60 MARKS