



GCSE Foundation/Higher 12

Algebra



Mark scheme



91 minutes



83 marks

Formulae

M1. (a) $C = 10d + 20$

B1

(b) Plots at least two correct points ($\pm \frac{1}{2}$ sq)

M1

Correct line from (0, 30) at least to intersection at (5, 70)

A1

(c) First Cars

Strict ft

B1 ft

Cheaper (check graph)

Graph lower down

Roys Rentals = 90

and First Cars = 86

oe

B1 ft

[5]

M2. (a) $12 - x = 15$ or $12 - x = 5 \times 3$

oe $4 - \frac{x}{3} = 5$

M1

$-x = \text{their } 15 - 12$ or $x = 12 - \text{their } 15$

or $4 - 5 = \frac{x}{3}$

$-1 = \frac{x}{3}$

or $5 - 4 = \frac{-x}{3}$

M1

-3

A1

(b) $3t = s - 4$ or $\frac{s}{3} = t + \frac{4}{3}$

oe

M1

$(t =) \frac{s-4}{3}$ or $(t =) \frac{s}{3} - \frac{4}{3}$ or $(t =) \frac{4-s}{-3}$

oe

SC1 $(t =) \frac{4-s}{3}$ or $(t =) \frac{s+4}{3}$

A1

[5]

M3. (a) $C = 8d + 16$

Last one

B1

(b) Plots graph ... at least two correct coordinates for $C = 9d + 11$

Works out costs for at least 2 days for Woods Tool Hire ... 20, 29, 38, 47, 56 ... (minimum of 2 of these)

M1

Correct straight line to intersection at (5, 56)

Identifies equal cost for 5 days

A1

No ticked with valid statement

No may be implied

eg cheaper up to 4 days, equal costs for 5 days, more expensive for 6 days onwards

A1

Alternative method 1

$8d + 16 = 9d + 11$

M1

$d = 5$

A1

No ticked with valid statement

No may be implied

eg cheaper up to 4 days, equal costs for 5 days, more expensive for 6 days onwards

A1

Alternative method 2

9 x their d + 11

their $d \geq 5$

M1

Correct calculation

A1

Corresponding correct value from
Branch Tool Hire **and** No ticked
No may be implied

From graph or using correct formula

A1

[4]

M4. (a) $C = 10d + 5$

B1

(b) Correct substitution of a value for d in formula
 $20, 25, 30$

M1

Identifies equal pay at $d = 2$

M1 dep

No and cheaper at $d > 2$
oe

A1

Alternate method

Plots at least two correct coordinates on graph for mountain bike
 $(0, 15) (1, 20) (2, 25) (3, 30)$

M1

Correct line at least as far as intersection at $(2, 25)$

M1 dep

No and cheaper at $d > 2$

A1

[4]

M5. (a) 120

B1

(b) $x(2x - 1)$

Condone $x \times (2x - 1)$

B1

(c) 120

ft Their (a)

B1ft

[3]

M6. (a) $S - 40$

$$\frac{S}{3} = t + \frac{40}{3}$$

M1

$$t = \frac{S - 40}{3}$$

oe

$$t = \frac{S}{3} - \frac{40}{3}$$

A1

(b) $3t < 70 - 40$

M1

$$t < 10$$

A1

[4]

M7. (a) (i) 210

B1

(ii) 170

B1

(iii) $50 \times (\text{their } 210) \div (\text{their } 170)$

M1

61.7(...) or 61.8

or 62 with method

ft From their T and $a + b + c$

A1ft

(b) Fair

ft From their F

B1ft

[5]

M8. $y + 3 (= 4x)$

or $\frac{y}{4} = x - \frac{3}{4}$

M1

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

oe

SC1 $(x =) \frac{(y-3)}{4}$ oe

A1

[2]

M9. (a) (i) 2×2^2 or 2×3^2 or 2×5^2

M1

All three

A1

(ii) 98

B1

(b) $2 \times 3 \times 7$ or 42

*B1 Any number with exactly 3 different
prime factors except 30*

B2

[5]

M10. (a) $50 \times 2 + 120$

or Better, eg, $100 + 120$

M1

220

A1

(b) $5 \times 200 = m + 750$

or $200 = \frac{m}{5} + 150$

M1

250

A1

[4]

M11. Allow embedded solutions, but if contradicted M marks only

True or T for $y = x + 3$

B1

False or F

B1

[2]

M12. (a) Evidence of searching for a pattern or $10n$

eg, $\begin{array}{cccccc} 100 & 110 & 120 & 130 & 140 \\ & 10 & 10 & 10 & 10 \end{array}$

M1

$10n + 90$

oe

A1

(b) $4n < 35$

$4n = 35$ leading to $n = 8.75$ is M0 unless n given as 8

M1

$n < 35 \div 4$ or $n < 8.75$

$4n = 35$ leading to $n < 8.75$ is M1, A1

A1

$n = 8$

A1

[5]

M13. (a) $6x + 5$

B1 $6x$ or $+ 5$ eg $6x - 5$ scores B1

B2

(b) 15

B1

- (c) (i) $1 \times 3 + 4$ or $1 \times (3 + 4)$
or $3 + 4$ or 1×7 M1
- $1 \times 3 + 4$ and $1 \times (3 + 4)$
or $3 + 4$ and 1×7 M1
- 7 (must see both methods and answers)
SC1 7 with no working A1

- (c) (ii) $a(b + c) = ab + ac$, or
Comparison of add b to c then multiply by a with multiply
 a by b then add c
oe
or complete counter example (showing both expressions have
different values when $a \neq 1$ or $c \neq 0$)
B1 incomplete comparisons or counter examples B2
- [8]

- M14.** (a) (i) y^9 B1
- (ii) y^5 B1
- (iii) y^{14} B1
- (b) (i) y^{14} or (a)(iii)
ft their answers from Part (a) B1 ft
- (ii) y^5 or a(ii)
ft their answers from Part (a) B1 ft
- [5]

- M15.** Always even B1
- Could be either odd or even B1
- [2]

M16. (a) $3 \times (-2) + 20$
 -6 seen

M1

14

A1

(b) $3 \times 16 + 5$

M1

53

A1

(c) Any k which is a multiple of 4

eg 1 $\frac{1}{2} \times 4 + 1 (= 3)$ or $\frac{1}{2} 4 + 1$

eg 2 $K = 8$

B1

(d) Sum of 2 + any other prime

nb 1 is not prime: $1 + 2 = 3$ B0

B1

[6]

M17. (a) Full explanation. E.g.
 O – 1 is always E and
 E + E is always E, or
 E + O is always O and
 O – 1 is always E

B1 one or more examples with conclusion, or,

O – 1 is always E, or,

E + E is always E, or,

E + O is always O

B2

(b) 2 identified as even prime

E.g. $O + E - 1$ is always E and 2 is an even prime

E.g. $1 + 2 - 1 = 2$

B1

[3]

M18. (a) Tick in odd box

B1

(b) 3 examples to show $p^2 + 1$ is even
or

odd \times odd = odd or $(O \text{ or } p)^2 = O$
and odd + 1 = even

*B1 for one example only
or odd \times odd = odd
or odd + 1 = even*

B2

[3]

M19. (a) 18 and – 12 seen

M1

6

A1

(b) $22x$ or $22 \times x$ or $x \times 22$
or $500 - x22$

M1

$500 - 22x$ oe

SC1 $5 - 0.22x$ oe

A1

[4]

M20. (a) $6x + 10y$

oe

*B1 for $6x$ or $10y$ oe seen
No penalty for eg $x6$*

B2

(b) 2×20 or 6×5

*or 2×25 or 4×5
or 6×25 or 4×20*

M1

70

A1

[4]

