

PRACTICE PAPER SOLUTIONS



Rewarding Learning

General Certificate of Secondary Education

Mathematics

Unit M4

(Calculator)

Higher Tier

PRACTICE

**MARK
SCHEME**

1	$(-6, 2)$	A1A1
2	8550	MA1
	8122.5	MA1
	7716.375 accept 7716) or (7716.38) or (7716.4)	MA1
3	(a) $1.5 \times 3 + 4.5 \times 5 + 7.5 \times 4 + 10.5 \times 7 + 13.5 \times 1 (= 144)$	M1A1
	$= 144 \div 20$	MA1
	$= 7.2$	A1
	(b) midpoints used are not exact values of growth of plant, hence mean is only an estimate of growth.	A1
4	$26^2 = 10^2 + x^2$	MA1
	$x^2 = 26^2 - 10^2 = 576$	A1
	$x = 24\text{km}$	A1
5	$26520 - 11500 = 15020$	MA1
	20% of 15020 = 3004	M1A1
	$26520 - 3004 = 23516$	MA1
	$23516 \div 12 = 1959.67$	A1
6	$5n = 24 + n$	MA1
	$4n = 24$	A1
	$n = 6$	A1

7 Line of best fit drawn MA1
Line used accurately MA1

8 $4x - 23 = 2x + 35$ or $3x + 4x - 23 + 3x + 2x + 35 = 360$ M1
 $2x = 58$ or $12x = 348$ MA1
 $x = 29$ $x = 29$ MA1

OR

$4x - 23 + 3x = 180$ or $3x + 2x + 35 = 180$ (M1)
 $7x = 203$ $5x = 145$ (MA1)
 $x = 29$ $x = 29$ (MA1)

9 $106\% = \text{£}710.20$ MA1
 $\frac{710.20}{106} \times 100$ MA1
 $= \text{£}670$ A1

10 (a) City A because the 'box' is greater A1

(b) City B as it has higher median A1

(c) 18 A1

11 Volume of cylinder = $\pi \times 3^2 \times 7.2$
= 203.575..... MA1

Volume of cone = $\frac{1}{3}\pi \times 3^2 \times 4.2$ MA1
= 39.584.....

Total volume = 240 A1

NB: The final mark can only be awarded for correct formulae throughout.

12 (a) $20x^2 - 15x + 8x - 6$ MA1
 $20x^2 - 7x - 6$ A1

(b) $(x - 4)(x + 4)$ A1A1

(c) $\frac{1}{(x-4)}$ A1A1

13 (a) $9009 = 9 \times 1001$ MA1
= $3 \times 3 \times 7 \times 11 \times 13$ A1
or $3^2 \times 7 \times 11 \times 13$

(b) $3 \times 3 \times 7$ MA1
= 63 A1

- 14** $\sin 50^\circ = \frac{h}{3}$ M1
- $h = 2.298133329$ A1
- Area = 5×2.298133329 M1
- $= 11.4906\dots\dots$ A1
- 15** (a) Gradient = 3 M1A1
- $y = 3x - 1$ MA1
- (b) Gradient = $-\frac{1}{3}$ MA1
- $y = -\frac{1}{3}x + c$ M1
- $4 = -\frac{1}{3}(6) + c$
- $c = 6$
- $y = -\frac{1}{3}x + 6$ MA1
- 16** Maximum weight of coffee and jar = 672.5 g MA1
- Minimum weight of jar = 447.5 g MA1
- Maximum weight of coffee = $672.5 - 447.5$
- $= 225$ g MA1

17 (a) $p = 74$, alternate segment theorem A1A1

(b) Base angles of large triangle 106 and 37 MA1

3rd angle in triangle and hence angle q (same segment) = 37 MA1

or

Base angles of isosceles triangle = 37 and 37 (MA1)

By alternate segment $q = 37$ (MA1)

18 $\frac{60}{250} \times 108$ MA1

= (25.92) Accept only 25 or 26 A1

19 Area of cross section = $(2.2 \times 1.5) + \frac{1}{3} \pi \times 1.5^2$ M1

= 5.656 A1

Volume = 5.656×3.6 MA1

20.3623 or (20.3616) A1

Alternative solution

Volume of cuboid = $1.5 \times 2.2 \times 3.6 = 11.88$ (MA1)

$\frac{1}{3}$ (volume of cylinder) = $\frac{1}{3} \times \pi \times 1.5^2 \times 3.6$ (M1)

= 8.4823 (A1)

Total volume = 20.3623 (A1)

20

$$t = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(5)(-11)}}{2(5)}$$
$$= \frac{8 \pm 2\sqrt{71}}{10}$$

$t = 2.49$ or -0.89

MA1A1A1

21 (a) 0 – 20 20

20 – 50 90

50 – 80 75

80 – 100 36

100 – 120 4

MA2

$$(20 \times 10 + 90 \times 35 + 75 \times 65 + 36 \times 90 + 4 \times 11) \div 225$$

MA1

$$= 11905 \div 225 = 52.9$$

A1

(b) 75 less M (or 150 more than M) so 55 in second group

(so 35 in second group)

MA1

$$\frac{55}{90} \text{ of } 30 \text{ is } 18.3$$

A1

$$M = 38.3 \text{ minutes}$$

A1

22 $30 \times 68.4 = 2052$ MA1

$16 \times 74 = 1184$ MA1

$\frac{868}{14} = 62$ M1A1

23 Midpoint of QS = (8, 3) MA1

Gradient of QS = $\frac{1}{3}$ MA1

Gradient of PR = -3 A1

Equation of PR $y = -3x + c$ M1

$3 = -3(8) + c$

$c = 27$

$y = -3x + 27$ A1

24 (a) $5a(20x^2 + 13xy - 15y^2)$ A1

$5a(5x - 3y)(4x + 5y)$ A1A1

(b) $\frac{1}{4}(2n^2 + 8n + n + 4) - \frac{1}{2}n^2 - \frac{1}{4}n$ A1

$= \frac{1}{2}n^2 + \frac{9}{4}n + 1 - \frac{1}{2}n^2 - \frac{1}{4}n$ A1

$\frac{8}{4}n + 1 = 2n + 1$ A1

$$25 \quad \frac{2}{x-3} + \frac{3}{2x-5} = 3 \quad \text{MA1}$$

$$2(2x - 5) + 3(x - 3) = 3(x - 3)(2x - 5) \quad \text{MA1}$$

$$4x - 10 + 3x - 9 = 3[2x^2 - 6x - 5x + 15] \quad \text{MA1}$$

$$7x - 19 = 6x^2 - 33x + 45$$

$$6x^2 - 40x + 64 = 0 \quad \text{MA1}$$

$$3x^2 - 20x + 32 = 0$$

$$(3x - 8)(x - 4) = 0 \quad \text{MA1}$$

$$x = 4, x = 8/3 \text{ (invalid)} \quad \text{A1}$$

$$\text{length P} = 2, \text{ length Q} = 1 \quad \text{A1}$$