

General Certificate of Secondary Education

Mathematics 3302 Specification B

Module 5 Paper 2 Tier I 3300512

Mark Scheme

2006 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

The following abbreviations are used on the mark scheme:

| Μ | Method marks awarded for a correct method. |
|-------|---|
| Α | Accuracy marks awarded when following on from a correct method. It is not necessary always to see the method. This can be implied. |
| В | Marks awarded independent of method. |
| M dep | A method mark which is dependent on a previous method mark being awarded. |
| ft | Follow through marks. Marks awarded for correct working following a mistake in an earlier step. |
| SC | Special Case. Marks awarded for a common misinterpretation which has some mathematical worth. |
| oe | Or equivalent. |
| eeoo | Each error or omission. |

MODULE 5 Paper 2 INTERMEDIATE TIER

33005/I2

| 1 | $\frac{36}{100} \times 420$ | M1 | 0.36 × 420 or full 10%, 10%, 10%, 5%, 1% method |
|---|-----------------------------|----|--|
| | 151.20 | A1 | not 151.2 Ignore subsequent working such as 420 – 151.20 Answer £268.8(0) with no working SC1 |

| 2 | $\frac{5}{8}$ or $\frac{8}{5}$ seen | B1 | or 5 miles = 8 km oe |
|---|---|----|--|
| | $17 \times \frac{5}{8} (= 10.625)$ or $11 \times \frac{8}{5} (= 17.6)$ | M1 | oe but do not allow 0.63, 0.6, 0.62 for $\frac{5}{8}$ |
| | 10.625 or 17.6 and Jon | A1 | No working = no marks |
| | Alternative method | | |
| | 5 miles = 8 km B1 | | |
| | 10 miles = 16 km and 1 mile > 1 km M1 | | |
| | 11 miles > 17 km and Jan A1 | | |

| 3(a) | 70° at P <u>or</u> 50° at Q | B1 | ±2° |
|------|--|--------|--|
| | Both angles within tolerance and triangle drawn with ruler | B1 | SC1 for 50 at P and 70 at Q if otherwise correct Letter R on triangle not required |
| 3(b) | 7 | B1 dep | ±5 mm dep on both B1s above |

| 4(a) | 180 - 90 - 23 | M1 | or 90 – 23 |
|------|-----------------|--------|------------|
| | 67 | A1 | |
| 4(b) | 180 - 96 (= 84) | M1 | |
| | their 84 ÷ 3 | M1 dep | |
| | 28 | A1 | |

| 5(a) | (Line is) $y = 3$ | B1 | x = 3 goes up the page oe Must show that she has confused x and y |
|------|-------------------|----|---|
| 5(b) | x = 2 | B2 | B1 for both points plotted and line drawn |

| 6(a) | $7^2 + 3 \times -4$ | M1 | 14 + 3 × -4 M0 |
|---------------|--|--------|---|
| | 37 | A1 | |
| 6(b)(i) | 10 | B1 | |
| 6(b)(ii) | 4y = 9 + 1 or $4y = 10$ | M1 | |
| | 2.5 or $2\frac{1}{2}$ or $\frac{5}{2}$ | A1 | |
| 6(b) (iii) | 4z + 12 (= 8) | M1 | Allow embedded answers through Q6b unless contradicted on answer line when A1 is lost or $(z + 3 =) 8 \div 4$ or 2 |
| | 4z = 8 - 12 or $4z = -4$ | M1 dep | z = 2 - 3 |
| | -1 | A1 | -1 |
| 6(b) (iv) | 3t + 2t (5t) = 19 - 4 (15) | M1 | or $-2t - 3t(-5t) = 4 - 19(-15)$ Allow one sign error |
| | 5t = 15 | A1 | or $-15 = -5t$ |
| | 3 | A1 | |
| | | | |
| 7 | 11.6 × 7.7 | M1 | Mark lost if ÷2 at any stage |
| | 89.32 | A1 | or 89.3 |
| | | | 89 with no working M1A0 |
| | | | |
| 1 | | | |

| 8 | $26.7 \div \pi$ | M1 | Later ÷2 does not lose this M1 |
|---|-----------------|----|---------------------------------------|
| | 8.5 | A1 | Allow 8.49 to 8.51 |

| 9 | 21.5 × 17.2 (= 369.8) | M1 | |
|---|--|--------|---|
| | 21.5 - 4 - 4 (= 13.5) | M1 | or 17.2 – 4 – 4 (= 9.2) |
| | their $13.5 \times \text{their } 9.2 \ (= 124.2)$ | M1 dep | dep on M1 in line 2 |
| | their 369.8 – their 124.2 | M1 dep | dep on all 3 previous M1s |
| | 245.6 | A1 | or 246 SC2: Answer 138.8 or 139 |
| | Alternative build up method | | |
| | 21.5 × 4 (= 86) | M1 | or 17.2 × 4 (= 68.8) |
| | 17.2 - 4 - 4 (= 9.2) | M1 | or 21.5 – 4 – 4 (= 13.5) |
| | their $9.2 \times 4 (= 36.8)$ | M1 dep | or their $13.5 \times 4 (= 54)$ dep on M1 in line 2 |
| | $2 \times \text{their } 86 + 2 \times \text{their } 36.8$ | M1 | or $2 \times$ their $68.8 + 2 \times$ their 54 dep on all 3 previous M1s |
| | 245.6 | A1 | or 246 |
| | Another build-up method | | |
| | $4 \times 4 (= 16)$ | M1 | |
| | 17.2 - 4 - 4 (= 9.2) | M1 | or 21.5 – 4 – 4 (= 13.5) |
| | their $9.2 \times 4 (= 36.8)$ | M1 dep | or their $13.5 \times 4 (= 54)$ dep on M1 in line 2 |
| | $2 \times \text{their } 36.8 + 2 \times \text{their } 54 $ $+ 4 \times \text{their } 16$ | M1 | dep on all 3 previous M1s |
| | 245.6 | A1 | or 246 |

| 10 | Trial for $3 < x < 4$ | B1 | Correctly evaluated at least to the nearest whole number |
|----|--|--------|---|
| | Two trials for $3.8 \le x \le 3.9$ that "bracket" 72 | B1 | These trials correct or truncated to at least 1 dp \underline{x} $\underline{x^3 + 4x}$ \underline{x} $\underline{x^3 + 4x}$ 3.1 42.191 3.6 61.056 3.2 45.568 3.7 65.453 3.3 49.137 3.8 70.072 Allow 70 here 3.4 52.904 3.9 3.5 56.875 3.85 72.466 |
| | Trial at 3.85 and answer 3.8 | B1 dep | dep on previous B1 |

| 11 | Use of $\frac{1}{2}$ triangle | M1 | Evidence such as 9 in Pythagoras |
|---------------|---|--------------|---|
| | $18^2 - 9^2 (= 243)$ | M1 | Need – not + |
| | $\sqrt{\text{their } 243}$ | M1 dep | dep on both M1s above |
| | 15.58 to 15.6 | A1 | |
| | Alternative method | | |
| | Use of $\frac{1}{2}$ triangle | M1 | Evidence of 60° used |
| | $\frac{h}{18} = \sin 60^{\circ}$ | M1 | or $\frac{h}{9} = \tan 60^\circ$ |
| | $18 \times \sin 60^{\circ}$ | M1 | or 9 \times tan 60° |
| | 15.58 to 15.6 | A1 | |
| 12 | 15 10 50 (- 12500) | N/1 | |
| 12 | $13 \times 18 \times 50 (= 13500)$ 12000 ÷ their 13500 | M1 M1 dep | Allow also 12 ÷ their 13500 for this |
| | | <u> </u> | M1 |
| | 0.88 10 0.90 | AI | 0.8 |
| 13(a) | 5x < 18 - 3 or 15 | M1 | Allow \leq but not = unless recovered in answer |
| | <i>x</i> < 3 | A1 | x = < 3 scores M1A0 |
| 13(b) | $-3 \le y < 0$ | M1 | (2y =) -6, -5, -4, -3, -2, -1, (0) scores M1 |
| | -3, -2, -1 | A2 | -1 each error, omission or extra |
| 14() | 2 + 7 + 2 + 14 | N(1 | |
| 14(a) | $\frac{p}{2} + \frac{p}{2} + \frac{2p}{14} + \frac{14}{14}$ | MI | For 3 correct terms |
| 14(b) | $p^{-} + 9p + 14$ | Al | |
| (i) | $(x \pm a)(x \pm b)$ | M1 | Where $ab = 6$ |
| | (x+3)(x-2) | A1 | |
| 14(b) (ii) | -3 <u>and</u> +2 | B1 | ft if M1 earned in (b)(i) |
| 15(a) | Sight of tongont | M1 | M2 for any complete method |
| 13(a) | | 1VI 1 | M2 for any <u>complete</u> method |
| | $\tan\left(x\right) = \frac{10}{7}$ | M1 | $\tan(x) = 2.28(57)$ |
| | 66.3 to 66.4 | A1 | Note: Measured angle is 64° Accept 66 if method seen |
| 15(b) | cos 37° or sin 53° | M1 | M2 for any <u>complete</u> method |
| | 12.6 ÷ cos 37° | M1 | |
| | 15.77 to 15.8 | A1 | |

| 16 | Equal arcs on DE and EF and intersecting arcs | M1 | |
|----|---|----|--|
| | Bisector accurate to $\pm 2^{\circ}$ | A1 | |

| 17 | 47 | B1 | |
|----|--------------|----|------------------------------|
| | Same segment | B1 | On same arc On same chord |

| 18(a) | 2 | B1 | |
|-------|--------------------------------------|-------|---|
| 18(b) | At least 6 accurate plots | B1 ft | ± half a square |
| | Smooth curve | B1 | Fully correct |
| 18(c) | It gets closer to the <i>x</i> -axis | B1 | It gets closer to 0 y becomes a smaller decimal/fraction The graph gets flatter The graph levels out It gets smaller but does not touch the x-axis |