



GCSE MARKING SCHEME

JANUARY 2016

**MATHEMATICS UNITISED - UNIT 1
HIGHER TIER
4351/02**

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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1. (Area =) $\frac{70+100}{2} \times 40$ OR $\frac{40 \times 30}{2} + (70 \times 40)$ $= 3400(\text{m}^2)$	M1 A1 2	
2. (a) Line starts at (0, 20). A straight line with gradient 2°C / sec. A straight line from (30,80) to (40,80). A straight line from (40,80) to (60,20). (b) 60(°C) in 20 (seconds) or equivalent. 3	B1 B1 B1 B1 M1 A1 6	Accept plot if no line drawn. Need not end at (30, 80) <i>BUT see below</i> . F.T. from 'their (30,80)'. F.T. 'their (40,80)'. Ignore any line drawn beyond 60 seconds. Penalise -1 once only if no straight lines drawn between plots. <i>If all four B1s gained but graph incorrect (e.g. first line did not end at (30,80) penalise -1.</i> OR FT from their graph
3. 2.9	B2 2	B1 for 2.8(8.....)
4(a) Attempt at $5 \times 4 + 8 \times 6 + 9 \times 7 + 13 \times 1$ (144) $\div 18$ $= 8$ (medals) (b) Sharks because the highest possible number in the Dolphins is 12.	M1 m1 A1 E1 4	M1 for the attempt at $\sum fx$. C.A.O. Unsupported answer of 8 is M0m0A0. Must refer to '12' for E1 to be awarded.
5. Attempt at using Speed = distance / time. (Average speed =) $10 / \frac{1}{3}$ or equivalent $= 30(\text{mph})$ Yes he could have gone over the speed limit as the 30mph is only an average speed. E.g. 'Yes because it's only an average (speed)' (E1) 'Yes, he could have gone faster, then slower' (E1) BUT 'Yes he could have gone faster'. (E0).	M1 m1 A1 E1 4	e.g. 10(miles) / 20(min) or 10 / 'their time difference'. C.A.O. Independent mark. Must state, or unambiguously imply, 'Yes' AND give a clear explanation. FT 'their average speed' <u>provided</u> it is 40mph or less.
6. (Volume =) $\pi \times 5^2 \times 14$ $= 1099.5(\dots)$ (cm ³) or 350π . 'Yes' because 1 litre is (only) 1000cm ³	M1 A1 B1 3	Accept answers between 1099 and 1100 inclusive. F.T. from 'their <u>derived</u> cylinder volume'. 350π must be evaluated for comparison. Must indicate that 1 litre equals 1000(cm ³). 'Yes' may be implied.
7. 5720 <u>171.6(0)</u> 5891.6(0) <u>176.74(8)</u> 6068.34(8) or 6068.35 OR 171.6(0) and 176.74(8) (£)348.35	B1 M1 A1 A1 4	For a correct evaluation of 3% OR Sight of 1.03 (343.2 implies 2×171.6 and gains B1). For correctly attempting to find 2 different 3%. OR 5720×1.03^2 . F.T. one error. Must be given correct to the nearest penny. (£) 348.34 is B1M1A1A0. Treat depreciation as a misread.

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<p>8. (2013 to 2014 calculations)</p> $\frac{4000}{18000} (\times 100) \text{ OR } \frac{2000}{18000} (\times 100)$ <p>OR 0.06×18000 OR 1.06×18000</p> $22(.2..)(\%) \text{ OR } 11(.1..)(\%)$ <p>OR (£)1080 OR (£)19080</p> <p>(2014 to 2015 calculations)</p> $\frac{1000}{22000} (\times 100) \text{ AND } \frac{1500}{20000} (\times 100)$ <p>= 4.5(..)(%) AND = 7.5(%)</p> <p>OR</p> $0.06 \times 22000 \text{ AND } 0.06 \times 20000$ <p>= (£)1320 AND = (£)1200</p> <p>OR</p> $1.06 \times 22000 \text{ AND } 1.06 \times 20000$ <p>= (£)23320 AND = (£)21200</p> <p>(Dear Ms Farah) A correct interpretation of the results in the context of the question. [Ms Farah did not have a 6% increase each year (despite higher overall sales)].</p> <p>(Dear Mr Price) A correct interpretation of the results in the context of the question. [Mr Price did have a 6% increase each year (despite lower overall sales)].</p> <p>Look for</p> <ul style="list-style-type: none"> • spelling • clarity of text explanations and correct units shown • the use of notation <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answers <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answers 	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>(M1) (A1)</p> <p>(M1) (A1)</p> <p>B1</p> <p>B1</p> <p>QWC 2</p> <p>8</p>	<p>(Calculation for Ms Farah OR Mr Price gains M1A1) Sight of any one gains M1.</p> <p>Sight of any one gains A1.</p> <p>(Calculation for Ms Farah AND Mr Price required with no arithmetical error.) Both required for M1.</p> <p>Both required for A1.</p> <p>(Both required for M1.) (Both required for A1.)</p> <p>(Both required for M1.) (Both required for A1.)</p> <p>F.T. correct interpretation for their derived results. Do not award marks for simply re-stating their results with no reference to the (6%) challenge set.</p> <p>If no marks gained allow SC1 for sight of $(1.12 \times 18000 =) (\pounds)20160$ OR $(1.06^2 \times 18000 =) (\pounds)20224.8(0)$</p> <p>QWC2. Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC1. Presents relevant material in a coherent and logical manner, but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weakness in organisation of material but using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC0. Evident weakness in organisation of material and errors in use of mathematical form, spelling, punctuation and grammar.</p>

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<p>9. Strategy to find (Fractional or % or actual) return for either currency.</p> <p>(\$) 0.88(04..) or 88(.04..) (Return) (peso) 0.90(15..) or 90(.15..) (Return)</p> <p>More is lost on the Dollar (\$)</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>4</p>	<p>E.g. $\frac{1.62}{1.84} (\times 100)$ or $\frac{20.24}{22.45} (\times 100)$</p> <p>OR using $\pounds x$</p> <p>$\pounds x \times \frac{1.62}{1.84}$ or $\pounds x \times \frac{20.24}{22.45}$</p> <p>If $x = \pounds 100$, £88(.04) return or £11.96 (or £12) lost. If $x = \pounds 100$, £90(.16) return or £9.84 (or £10) lost. Allow rounding, from a correct calculation, as long as a correct comparison is still possible.</p> <p>F.T. their calculated amounts.</p>
<p>10. $5 \times \frac{21}{15}$</p> <p>$\times \frac{8}{6}$</p> <p>= 9.3(...)</p> <p>10 (cleaners required)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>4</p>	<p>M2 for correct use of the '5' with all four of the numbers 21, 15, 8 and 6.</p> <p>M1 for correct use of the '5' with any two of the numbers 21, 15, 8 and 6.</p> <p>C.A.O. Pre approximation that does not lead to 9.3 is A0 F.T. provided at least M1 gained and rounding up of 'cleaners' required.</p>
<p>11. A correct strategy.</p> <p>OR 'Their 9h 40m' + 18:00 – 5(hours) 'their 03:40' – 5(hours)</p> <p>YES (as they finish their slot at) 22:40 (NY time) or equivalent unambiguous statement.</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>3</p>	<p>e.g. <u>Attempt</u> to add times 20m + 1h + 7h20m + 40m + 20m (= 9h 40m) OR <u>Attempt</u> to find 'time steps' 18:00, 18:20, 19:20, 02:40, 03:20, 03:40. For the S1 and M1 do not penalise incorrect calculation or if final 20m session omitted. For a correct <u>attempt</u> at addressing the 5 hour time difference. The 5 hours may be subtracted at any point along the 'time steps'.</p> <p>A0 if any incorrect calculations made. (No F.T.) 'YES' must be stated or implied. Allow sight of 22:20 as final time calculation if clear implication made that there is enough time to perform. Allow '10:40', for this question, to infer '10:40 p.m.'.</p>
<p>12(a) $\frac{451}{55} \times 100$ or equivalent</p> <p>= (£)820</p> <p>(b) (£)48 $\times \frac{3}{4}$ or equivalent</p> <p>= (£)36</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>4</p>	<p>M1A0 for premature approximation. E.g. '48 ÷ 1.33 = £36.09' or '48 ÷ 1.3 = £36.92'.</p>

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13(a)	14 (minutes)	B2	From 3h 7½m – 2h 53½m or equivalent. OR from for 3h 7m – 2h 54 m + 1m B1 for a <u>correct</u> time difference of 'a time > 3h 7m' – 'a time < 2h 54m'. (But only if the times used are seen). OR 3h 7½m – 2h 53½m attempted, but not evaluated correctly OR B1 for 3h 7m – 2h 54 m + 1m attempted, but not evaluated correctly.
(b)	Sight of $\sqrt{756 \cdot 25}$ $= 27 \cdot 5$ (m)	M1 A1	
	(So least length =) 26.5 (m) (Least area =) 702.25(m ²)	A1 A1 6	
14(a)	(Arc length =) $\frac{42}{360} \times 2 \times \pi \times 30$ $= 21 \cdot 9 \dots$ (cm) or 22 (cm) or 7π (Perimeter =) 82 (cm)	M1 A1 B1	F.T. 'their derived 22' + 60. Mark final answer.
(b)	$\frac{x}{360} \times \pi \times 30^2 = 534$ $x = \frac{534 \times 360}{\pi \times 30^2}$ $= 68^\circ$	M1 m1 A1 6	Allow 67.9(..). Mark final answer.
15.	Sight of $\frac{2}{3}\pi r^3$ AND $(2r)^3$ $\frac{2}{3}\pi r^3 + (2r)^3 = 1261 \cdot 8$ $r^3 = 125$ $r = 5$ $d = 15$ (cm)	B1 M1 A1 A1 B1 5	F.T. only if volume of hemisphere = $a\pi r^3$ AND volume of cube = br^3 where a and b are constants ($\neq 0$). C.A.O. F.T cube root of 'their 125' if M1 awarded. F.T $3 \times$ 'their r ' (even from an M0)