

# Gold Level

## Mark Scheme 7

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Difficulty Level	Gold
Booklet	Mark Scheme 7

**Time Allowed:** 59 minutes

**Score:** /49

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

Question Number	Working	Answer	Mark	Notes	
1. (a)	$\frac{BC}{5.2} = \frac{7}{5.6}$ oe or $\frac{BC}{7} = \frac{5.2}{5.6}$ oe		2	M1 for correct, relevant proportionality statement with 3 values substituted	
		6.5		A1 cao	
(b)	$\frac{DE}{7.5} = \frac{5.6}{7}$ oe or $\frac{DE}{5.6} = \frac{7.5}{7}$ oe or $\frac{DE}{5.2} = \frac{7.5}{"6.5"}$ oe or $\frac{DE}{7.5} = \frac{5.2}{"6.5"}$		2	M1 for correct, relevant proportionality statement with 3 values substituted	
		6		A1 cao	
(c)	(scale factor) eg $\frac{7}{5.6}$ or $\frac{5.6}{7}$ or $\frac{4}{5}$ oe or $\frac{5}{4}$ oe (May be implied by second M1) allow ratio notation		3	M1 Also award M1 for ht of $\triangle CDE$ $= \frac{4}{5} \times \frac{21}{\frac{1}{2} \times 7.5}$ (= 4.48)	M2 for eg. (Area $\triangle ABC$ =) $\frac{1}{2} \times 7 \times "6.5" \sin C = 21$ and (Area $\triangle CDE$ =)
	(scale factor) <sup>2</sup> eg $\left(\frac{4}{5}\right)^2$ oe or 0.64 or $\left(\frac{5}{4}\right)^2$ oe 1.5625 allow ratio notation			M1 Also award M1 for $\frac{1}{2} \times "6" \times "4.48"$	$\frac{1}{2} \times 5.2 \times 5.6 \sin C$
				Also award M2 for $s = \frac{5.2 + 5.6 + "6"}{2}$ (= 8.4) and Area = $\sqrt{"8.4"("8.4" - 5.2)("8.4" - 5.6)("8.4" - "6")}$	
		13.44		A1 Also accept 13.4 if both method marks scored	
				<b>Total 7 marks</b>	

2.	$12 + 3\sqrt{a} + 4\sqrt{a} + a$ or $12 + 7\sqrt{a} + a$		3	M1 Accept $\sqrt{a}\sqrt{a}$ or $(\sqrt{a})^2$ instead of $a$	
		$a = 5$		A1	Award B3 for $a = 25, k = 11$ or $a = 1, k = 3$
		$k = 7$		B1	
				<b>Total 3 marks</b>	

3.	(a)	$\frac{4}{5} \times \frac{3}{5}$	2	M1 or probability of $\frac{3}{5}$ clearly associated with box Y (eg may be on tree diagram or by box)
			$\frac{12}{25}$ oe	A1
	(b)	$\frac{4}{5} \times \frac{2}{5}$ , $\frac{1}{5} \times \frac{3}{5}$ or 0.32 oe or 0.12oe	3	M1 for $\frac{4}{5} \times \frac{2}{5}$ or $\frac{1}{5} \times \frac{3}{5}$
		$\frac{4}{5} \times \frac{2}{5} + \frac{1}{5} \times \frac{3}{5}$		M1 for sum of both products
			$\frac{11}{25}$ oe	A1
<b>Total 5 marks</b>				

4.	(a)	$t = kf^2$	3	M1 for $t = kf^2$ but not for $t = f^2$ Also award for correct equation in $t, f^2$ and a constant or for $t =$ some numerical value $\times f^2$
		$0.02 = k \times 8^2$ or $k = \frac{1}{3200}$ or $k = 0.0003125$ or $3.125 \times 10^{-4}$		M1 for $0.02 = k \times 8^2$ or for correct substitution into an equation which scores the first method mark (may be implied by correct evaluation of the constant)
			$t = 0.0003125f^2$ or $t = \frac{1}{3200} f^2$	A1 Award 3 marks if answer is $t = kf^2$ but $k$ is evaluated in part (b)
	(b)	$f^2 = \frac{0.0098}{0.0003125}$ or $f^2 = \frac{0.0098}{0.02} \times 8^2$	2	M1 for substitution and rearrangement into form $f^2 = \frac{0.0098}{k}$ with their value of $k$ except for $k = 1$ or $f^2 = \frac{0.0098}{0.02} \times 8^2$
			5.6 oe	A1
<b>Total 5 marks</b>				

5.	$\angle PAO = 90^\circ$ or $\angle PBO = 90^\circ$		4	M1	or M2 for $\angle PBA = 76^\circ$ or $\angle PAB = 76^\circ$	Angles may be stated or marked on diagram or used in calculations provided any use is not ambiguous
	$\angle AOB = 2 \times 76^\circ$ or $152^\circ$ or $\angle POA = 76^\circ$ or $\angle POB = 76^\circ$			M1		
	$360 - ("152" + 90 + 90)$ or $2 \times (180 - 76 - 90)$ or $180 - 2 \times 76$			M1		
		28		A1		
						<b>Total 4 marks</b>

6.	(a)		$\frac{4}{5}$ oe	1	B1	
	(b)	$\frac{1}{(\sqrt{x-1})^2 + 1}$ or $\frac{1}{x-1+1}$		2	M1	
			$\frac{1}{x}$		A1 Also accept $x^{-1}$	
						<b>Total 3 marks</b>

7.	$\frac{1}{1.25}$ oe eg $\frac{1}{\frac{5}{4}}, \frac{4}{5}, 0.8(0), \frac{100}{125}, 80\%$ $t_1 = \frac{d}{s}$ and $t_2 = \frac{d}{(1+0.25)s}$ or $\frac{t_1}{t_2} = 0.8$			3	M1	Alternative method (assigns values to distance and average speed)  M1 for calculating both times correctly M1 (dep) for finding $\frac{\text{Mon time} - \text{Tues time}}{\text{Mon time}}$
	$1 - 0.8$ oe eg $1 - \frac{4}{5}, 100\% - 80\%$				M1	
			20		A1	cao
						<b>Total 3 marks</b>

<b>8.</b>	$\angle ADC = 149^\circ$ or $\angle CAD = 21^\circ$		6	B1	May be stated or marked on diagram
	$\frac{AC}{\sin 149^\circ} = \frac{16.5}{\sin 10^\circ}$	$\frac{CD}{\sin 21^\circ} = \frac{16.5}{\sin 10^\circ}$		M1	for correct substitution in Sine Rule
	$(AC =) \frac{16.5 \sin 149^\circ}{\sin 10^\circ}$	$(CD =) \frac{16.5 \sin 21^\circ}{\sin 10^\circ}$		M1	for correct rearrangement
	$(AC =) 48.938\dots$	$(CD =) 34.052\dots$		A1	for correct length of $AC$ or $CD$ (rounded or truncated to at least 3 sf)
	$(AB =) "48.938\dots" \times \sin 69^\circ$ or $45.6(88\dots)$	$(BD =) "34.052\dots" \times \sin 59^\circ$ or $29.1(88\dots)$		M1	rounded or truncated to at least 3 sf
		45.7		A1	for ans which rounds to 45.7
					<b>Total 6 marks</b>

<b>Alternative scheme</b>	$(BD =) BC \tan 59^\circ$ oe		6	M1	Accept any clear notation throughout
	$BD + 16.5 = BC \tan 69^\circ$ oe			M1	
	$BD + 16.5 = \frac{\tan 69^\circ}{\tan 59^\circ} BD$ oe			M1	for equation in one variable
	$\left(\frac{\tan 69^\circ}{\tan 59^\circ} - 1\right) BD = 16.5$ or $0.5652\dots BD = 16.5$ oe			M1	for correct equation for one variable in the form $ax = b$
	$(BD =) 29.188\dots$			A1	for value which rounds to 29.2
		45.7		A1	for ans which rounds to 45.7
					<b>Total 6 marks</b>

9.	$x^2 + (3x + 2)^2 = 20$		6	M1 $\left(\frac{y-2}{3}\right)^2 + y^2 = 20$	
	$x^2 + 9x^2 + 6x + 6x + 4 = 20$ or $x^2 + 9x^2 + 12x + 4 = 20$			$\left(\frac{y^2 - 4y + 4}{9}\right) + y^2 = 20$ or $\left(\frac{y^2 - 2y - 2y + 4}{9}\right) + y^2 = 20$	
				M1 (indep) for correct expansion of $(3x + 2)^2$ or $\left(\frac{y-2}{3}\right)^2$ even if unsimplified	
	$5x^2 + 6x - 8 (= 0)$ or $10x^2 + 12x - 16 (= 0)$			A1 $5y^2 - 2y - 88 (= 0)$ oe Condone omission of '=' 0'	
	$(5x - 4)(x + 2) (= 0)$ or $(10x - 8)(x + 2) (= 0)$ or $(5x - 4)(2x + 4) (= 0)$ or $5x(x + 2) - 4(x + 2) (= 0)$ or $x(5x - 4) + 2(5x - 4) (= 0)$ or $\frac{-6 \pm \sqrt{6^2 - 4 \times 5 \times -8}}{2 \times 5}$ or better or $\frac{-12 \pm \sqrt{12^2 - 4 \times 10 \times -16}}{2 \times 10}$ or better			M1 $(5y - 22)(y + 4) (= 0)$ oe or $\frac{2 \pm \sqrt{(-2)^2 - 4 \times 5 \times -88}}{2 \times 5}$ or better Condone omission of '=' 0'	
	$x = \frac{4}{5}$ or $x = -2$			A1 $y = 4\frac{2}{5}$ or $y = -4$	dep on all preceding marks
		$x = \frac{4}{5}, y = 4\frac{2}{5}$ $x = -2, y = -4$		A1 No marks for $x = -2, y = -4$ with no working	
				<b>Total 6 marks</b>	

<p><b>10.</b></p>	<p><math>2 \times \pi \times 5.1^2 + 2 \times \pi \times 5.1 \times 3.7</math> oe <b>or</b></p> <p>163.42... + 118.56... (using <math>\pi</math>) <b>or</b>          163.3428 + 118.5036 (using 3.14)          (rounded or truncated to at least 3 sig          figs) <b>or</b></p> <p><math>2 \times \pi \times 5.1 \times (5.1 + 3.7)</math> <b>or</b></p> <p><math>\frac{2601}{50} \pi + \frac{1887}{50} \pi</math> <b>or</b>  <math>\frac{2244}{25} \pi</math></p>		<p>3</p>	<p>M2 M1 for one of  <math>2 \times \pi \times 5.1^2</math> <b>or</b>          value in range 163-163.43 inc  <b>or</b>  <math>\frac{2601}{50} \pi</math></p> <p><math>2 \times \pi \times 5.1 \times 3.7</math> oe <b>or</b>          value in range 118-119 inc <b>or</b>  <math>\frac{1887}{50} \pi</math></p> <p>NB. Accept 3.14(...) or 22/7 in          place of <math>\pi</math></p>
		<p>282</p>		<p>A1 for answer in range          281.8-282 inc</p>
				<p><b>Total 3 marks</b></p>



<b>11.</b>	<b>No approximation</b> $\frac{37527}{365}$ or $\frac{37527}{366}$ or $\frac{37527}{365.25}$ or $\frac{37527}{364}$			M2	M1 for $\frac{37527}{x}$ where $356 \leq x \leq 370$
		103		A2	Accept 102 if M2 awarded A1 for $102.5 \leq \text{answer} \leq 103.1$

<b>11.</b>	<b>Alternative - with approximation</b> $\frac{x}{y}$ or $x \times \frac{1}{y}$ where $x$ is $35\,000 \leq x \leq 40\,000$  <b>AND</b> $336 \leq y \leq 400$		4	M2	M1 for $\frac{x}{y}$ or $x \times \frac{1}{y}$ where either the value of $x$ <b>or</b> the value of $y$ is acceptable
		integer in the range 93 – 111 inclusive		A2	<b>The award of any accuracy  marks is dependent on the  award of M2</b>  A1 for non-integer in the range 93 – 111
				<b>Total 4 marks</b>	