AQA Qualifications

AQA Level 2 Certificate

FURTHER MATHEMATICS

Level 2 (8365)

Mark Scheme

Worksheet 1

Coordinate Geometry Circles

Version 2.0

Our specification is published on our website (www.aqa.org.uk). We will let centres know in writing about any changes to the specification. We will also publish changes on our website. The definitive version of our specification will always be the one on our website, this may differ from printed versions.

You can download this resource from our All About Maths website (http://allaboutmaths.aqa.org.uk/).

AQA Education (AQA) is a registered charity (number 1073334) and a company limited by guarantee registered in England and Wales (number 3644723). Our registered address is AQA, Devas Street, Manchester M15 6EX.

Glossary for Mark Schemes

These examinations are marked in such a way as to award positive achievement wherever possible. Thus, for these papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
M Dep	A method mark dependent on a previous method mark being awarded.
B Dep	A mark that can only be awarded if a previous independent mark has been awarded.
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$

1 Coordinate Geometry - Circles

Question	Answer	Mark	Comments
1(a)	$x^2 + (y - 3)^2 = 4$	B2	B1 LHS, B1 RHS
1(b)	$(x - 1)^2 + (y + 5)^2 = 16$	B2	B1 LHS, B1 RHS
1(c)	$(x + 3)^2 + (y - 4)^2 = 7$	B2	B1 LHS, B1 RHS
1(d)	$(x - 8)^2 + (y - 15)^2 = 289$ $(-8)^2 + (-15)^2$ $64 + 225 = 289$, Yes	B2 M1 A1	B1 LHS, B1 RHS oe
2(a)	$(r) = 6$ (centre =) (0, 0)	B2	B1 For each
2(b)	$(r) = 10$ (centre =) (3, 4)	B2	B1 For each
2(c)	$(r) = \sqrt{3}$ (centre =) (–5, 0)	B2	B1 For each
3	$\frac{-3+5}{2}$ or $\frac{6+12}{2}$ (1, 9) $\sqrt{(5-1)^2 + (12-9)^2}$ 5 $(x - 1)^2 + (y - 9)^2 = 25$	M1 A1 M1 A1 A1 ft	oe ft Their centre ft Their centre and radius
4(a)	(3, 3)	B1	
4(b)	$\sqrt{2^2 + 1^2}$ $\sqrt{5}$ $(x - 1)^2 + (y - 2)^2 = 5$	M1 A1 B1 ft	oe ft Their radius

Question	Answer	Mark	Comments
5(a)	$\frac{12+14}{2}$ or $\frac{6+4}{2}$	M1	
	(13, 5)	A1	
5(b)	$\sqrt{(20-13)^2+(12-5)^2}$	M1	ft Their M
	$\sqrt{98}$	A1	$\sqrt{7^2+7^2}$
	$\sqrt{49\times 2} = 7\sqrt{2}$	A1	$\sqrt{7^2(1+1)} = 7\sqrt{2}$
5(c)	$\sqrt{(20-12)^2+(12-6)^2}$	M1	oe
	10	A1	
6	$\frac{-2+12}{2}$	M1	
	$\frac{0+4}{2}$	M1	
	C (2, 5)	A1	
7	Gradient $AC = \frac{6-3}{4--2}$	M1	oe
	$= \frac{3}{6}$ $\left(=\frac{1}{2}\right)$	A1	oe
	Gradient $BC = -2$	B1 ft	
	$\frac{6-k}{4-6} = -2$	M1	
	$k = 2$	A1	
8	$(13-5)^2 + (-2-4)^2$	M1	
	$64 + 36 = 100$	A1	

Question	Answer	Mark	Comments
9	$(13 - a)^2 + (-2 - 4)^2 = 100$	M1	
	$169 - 13a - 13a + a^2 + 36$ (= 100)	M1	Allow 1 error
	$a^2 - 26a + 105 = 0$	A1	
	$(a - 5)(a - 21) = 0$	M1	
	$a = 5$ and $a = 21$	A1	
10(a)	$\frac{3 + 11}{2}$	M1	oe eg, 3 + 4
	$k = 7$	A1	
10(b)	$\sqrt{6^2 + (7 - 3)^2}$	M1	oe ft Their k
	$\sqrt{52}$	A1	
	$(x - 6)^2 + (y - 7)^2 = 52$	A1 ft	ft Their k and their radius
11(a)	C is (3, 5)	B1	
	Gradient $CP = \frac{5 - 1}{3 - 4}$	M1	
	-4	A1	
	Gradient $OP = \frac{1}{4}$	B1	
	$-4 \times \frac{1}{4} = -1$ So perpendicular (ie, tangent)	A1	
11(b)	$r = \sqrt{17}$	B1	
	$OP = \sqrt{4^2 + 1^2}$	M1	
	$= \sqrt{17}$	A1	

Question	Answer	Mark	Comments
12	Gradient $OP = \frac{2}{4}$ $\left(= \frac{1}{2}\right)$	B1	
	Gradient of tangent = –2	B1 ft	
	$y - 2 = -2\,(x - 4)$	M1	
	$y = -2x + 10$	A1	
13(a)	Centre (1, 9)	B2	B1 for each coordinate
	$r^2 = 3^2 + 4^2$ or $d^2 = 6^2 + 8^2$	M1	
	$(x-1)^2 + (y-9)^2 = 25$	A1ft	ft their centre
13(b)	Grad $AB = \frac{13-5}{4+2}$ or using their centre with A or B; or $\frac{8}{6}$ or $\frac{4}{3}$	M1	
	Grad tangent $-\frac{3}{4}$ or – their grad AB	M1	
	$y - 5 = \text{their } -\frac{3}{4}(x+2)$	M1	
	$3x + 4y - 14 = 0$	A1	