| **Question** | **Scheme** | | **Marks** |
| --- | --- | --- | --- |
| **1** | Mid-point of *PQ* is (4, 3) | | B1 |
| *PQ*: | | B1 |
| Gradient perpendicular to *PQ* | | M1 |
|  | | M1 |
| or 3*y* – 5*x* +11 = 0 or multiples e.g. 10*x* – 6*y* – 22 = 0 | | A1 |
|  |  | | **(5 marks)** |
| **2(a)** | Method 1 | Method 2  , so | M1 A1 |
| or  or | | M1 |
|  | | A1 |
| Method 3: Substitute *x* = –1, *y* = 2 and *x* = 7, *y* = –4 into *ax + by + c=0* | | M1 |
| –*a +*2*b + c =* 0 and 7*a* – 4*b* + *c* = 0 | | A1 |
| Solve to obtain *a* = 3, *b* = 4 and *c* = –5 or multiple of these numbers | | M1 A1 |
|  |  | | **(4)** |
| **2(b)** | Attempts  so  or | Or  equation with *x* = 16 substituted | M1 |
| , | So *y* =, *y* = 8 | M1 A1 |
|  |  | | **(3)** |
| **2(c)** | Either (*y=*) or 2 + *p* + 4 | Or use 2 perpendicular line equations through L and *N* and solve for *y* | M1 |
| (*y =* ) 14 | | A1 |
|  |  | | **(2)** |
|  |  | | **(9 marks)** |
| **3(a)** | Gradient of  oe | | B1 |
| Point *P* = (5, 6) | | B1 |
| or  or | | M1 |
| 5*x* + 4*y* – 49 = 0 | | A1 |
|  |  | | **(4)** |
| **3(b)** | **or** | | M1 |
| **and** | | M1 |
| **Method 1:** | | **dd**M1 |
| **Method 2:** | |
| **Method 3:** 2 Triangles | |
| **Method 4:** Shoelace method | |
| **Method 5:** Trapezium + 2 triangles | |
| = 36.9 | | A1 |
|  |  | | **(4)** |
|  |  | | **(8 marks)** |
| **4(a)** | (a) and attempt to find *m* from *y* = *mx* + *c* | | M1 |
|  | |  |
| (  ) so gradient = | | A1 |
| Gradient of perpendicular = (=  ) | | M1 |
| Line goes through (0,0) so | | A1 |
|  |  | | **(4)** |
| **4(b)** | (b) Solves their with their to form equation in *x* or in *y* | | M1 |
| Solves their equation in *x* or in *y* to obtain *x* = **or** *y* = | | dM1 |
|  | |  |
| *x*=4 or any equivalent e.g. 156/39 or *y* = 6 o.a.e | | A1 |
| *B*= (0,) used or stated in (b) | | B1 |
| Area = | | dM1 |
| (oe with integer numerator and denominator) | | A1 |
|  |  | | **(6)** |
|  |  | | **(10 marks)** |
| **5(a)** |  | |  |
|  | | B1 |
|  |  | | **(1)** |
| **5(b)** |  | | M1 A1 |
|  | | B1ft |
|  | | M1 |
| or | | A1 |
|  |  | | **(5)** |
| **5(c)** | or | | M1 |
|  | | A1 A1 cso |
|  |  | | **(3)** |
| **5(d)** |  | | “M1” |
|  | | A1 ft |
| **(\*)** | | A1 **cso** |
|  |  | | **(3)** |
| **5(e)** |  | |  |
|  | Finding the area of any triangle. | M1 |
|  |  |  |
|  |  | B1 |
|  |  | A1 |
|  |  | | **(3)** |
|  |  | | **(15 marks)** |
| **6(a)** | Gradient of  is | | B1 |
|  | | M1 |
| or | | M1A1ft |
|  |  | | A1 |
|  |  | | (5) |
| **6(b)** | When *y* = 0 | | M1 A1 |
|  |  | | **(2)** |
| **6(c)** | Correct attempt at finding the area of any one of the triangles or one of the trapezia. | | M1 |
| A correct numerical **expression** for the area of one **triangle** or one **trapezium** for **their coordinates**. | | A1ft |
| Combines the correct areas together correctly | | dM1 |
| Correct numerical expression for the area of *ORQP* | | A1 |
| Correct exact area e.g. or any exact equivalent | | A1 |
|  |  | | **(5)** |
|  |  | | **(12 marks)** |
| **7** | The equation of the circle is | | M1 A1 |
| The radius of the circle is  or  or | | M1 |
| So or equivalent | | A1 |
|  |  | | **(4 marks)** |
| **8(a)** | or | | M1 |
|  | | A1 |
|  |  | | **(2)** |
| **8(b)** |  | | M1 A1 oe |
|  |  | | **(2)** |
| **8(c)** |  | | B1 |
|  | | M1 |
|  | | M1 |
|  | | A1 |
|  |  | | **(4)** |
|  |  | | **(8 marks)** |
| **9(a)** |  |  |  |
|  | see notes. | M1 |
| Centre is |  | A1 **cao** |
|  |  |  | **(2)** |
| **9(b)** | So |  | M1 |
|  | (Award A0 for ). | A1 |
|  |  |  | **(2)** |
| **9(c)** | When | Putting in *C* or their *C*. | M1 |
|  | or , etc | A1 aef |
|  | Attempt to use formula or a method of completing the square in order to find | M1 |
|  |  | A1 **cao cso** |
|  |  |  | **(4)** |
|  |  |  | **(8 marks)** |
| **10(a)** |  | |  |
| Uses any appropriate method to find the coordinates of the centre, e.g. achieves . Accept (±5,±3) as indication of this. | | M1 |
| Centre is | | A1 |
|  |  | | **(2)** |
| **10(b)** | **Way 1** | |  |
| Uses  to give or  (not 30 – 25 – 9) | | M1 |
| *r* = 2 | | A1cao |
| **Way 2** | |  |
| Using from  (Needs formula stated or correct working) | | M1 |
| *r* = 2 | | A1 |
|  |  | | (2) |
| **10(c)** | **Way 1** | |  |
| Use *x* = 4 in *an* equation of circle and obtain equation in *y* only | | M1 |
| e.g.  or | |  |
| Solve their quadratic in *y* and obtain **two** solutions for *y* | | dM1 |
| e.g.  so *y* = | | A1 |
| **Way 2** | |  |
|  | Divide triangle *PTQ* and use Pythagoras with | M1 |
| Find *h* and evaluate  May recognise (1,√3, 2) triangle | dM1 |
| So *y* = | A1 |
|  |  | | **(3)** |
|  |  | | **(7 marks)** |
| **11(a)** | **Mark (a) and (b) together** | |  |
|  | | M1 |
|  | | **d**M1 |
|  |  | | A1**cso** |
|  |  | | **(3)** |
| **11(b)** |  | | M1A1 |
|  |  | | **(2)** |
|  |  | | **(5 marks)** |
| **12(a)** |  | | M1A1 |
|  |  | | **(2)** |
| **12(b)** | or  or or  Uses Pythagoras correctly in order to find the **radius**. Must clearly be identified as the **radius** and may be implied by their circle equation.  Or  or  Uses Pythagoras correctly in order to find the **diameter**. Must clearly be identified as the **diameter** and may be implied by their circle equation.  This mark can be implied by just 30 clearly seen as the **diameter** or 15 clearly seen as the **radius** (may be seen or implied in their circle equation)  **Allow this mark if there is a correct statement involving the radius or the diameter but must be seen in (b)** | | M1 |
|  | | M1 |
|  | | A1 |
|  |  | | **(3)** |
| **12(c)** | Distance | | M1 |
|  | | A1 |
|  |  | | **(2)** |
| **12(d)** | or | | M1 |
|  | awrt 41.8 | A1 |
|  |  | | **(2)** |
|  |  | | **(9 marks)** |

|  |  |  |  |  |  |
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|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | C1 2011 | 3 | 3.1 | Straight lines | 1.1b |
| 2 | C1 2017 | 8 | 3.1 | Straight-line graph (perpendicular gradients) | 1.1b, 2.1, 2.4 and 3.1a |
| 3 | C1 June 2014R | 7 | 3.1 | Equation of straight line and condition for perpendicularity | 1.1b, 2.1, 2.2a, 3.1a |
| 4 | C1 2014 | 9 | 3.1 | Coordinate geometry, perpendicularity | 1.1b, 3.1a |
| 5 | C1 2012 | 9 | 3.1, 2.4 | Straight lines, Indices and surds, Simultaneous equations | 1.1a, 1.1b, 2.1, 2.2a, 3.1a |
| 6 | C1 2016 | 10 | 3.1 | Lines, perpendicular | 1.1b, 2.1, 2.4, ,3.1a |
| 7 | C2 Jan 2012 | Q2 | 3.2 | Circles | 1.1b |
| 8 | C2 2016 | 3 | 3.1, 3.2 | Circles | 1.1b |
| 9 | C2 2011 | Q4 | 2.3, 3.2 | Circles | 1.1b, 3.1a |
| 10 | C2 2017 | 5 | 3.2 | Circles | 1.1a, 1.1b, 3.1a |
| 11 | C2 2014 | 9 | 3.2 | Circles | 1.1b, 3.1a |
| 12 | C2 June 2014R | 10 | 3.2 | Circles | 1.1b, 2.2a. 3.1a |