Perpendicular Lines and the Equation of a Tangent

Grade 8/9 topic · Higher tier · Edexcel and AQA

How to use this pack
20 questions that get harder as you go. Questions 1–15 (60 marks) build up to the harder Grade 8–9 style questions at the end; aim to complete all 20. Show your working on the lines and write your final answer on the answer line, then mark yourself with the answers at the back. Diagrams are not drawn accurately. Total: 86 marks.

Warm-up

1 A circle has equation $x^2 + y^2 = 25$. P(3, 4) lies on the circle and O is the origin. Work out the gradient of OP. **[3 marks]**

Answer _____

2 A circle has equation $x^2 + y^2 = 25$. P(−3, 4) lies on the circle and O is the origin. Work out the gradient of OP. **[3 marks]**

Answer _____

3 A circle has equation $x^2 + y^2 = 25$. P(−4, 3) lies on the circle and O is the origin. Work out the gradient of OP. **[3 marks]**

Answer _____

4 A circle has equation $x^2 + y^2 = 25$. P(3, −4) lies on the circle and O is the origin. Work out the gradient of OP. **[3 marks]**

Answer _____

5 A circle has equation $x^2 + y^2 = 169$. P(5, 12) lies on the circle and O is the origin. Work out the gradient of OP. **[3 marks]**

Answer _____

Core

6 A circle has equation $x^2 + y^2 = 100$. The point P(8, 6) lies on the circle. Work out the gradient of the tangent at P. **[4 marks]**

Answer _____

7 A circle has equation $x^2 + y^2 = 100$. The point P(−6, 8) lies on the circle. Work out the gradient of the tangent at P. **[4 marks]**

Answer _____

8 A circle has equation $x^2 + y^2 = 25$. The point P(4, 3) lies on the circle. Work out the gradient of the tangent at P. **[4 marks]**

Answer _____

9 A circle has equation $x^2 + y^2 = 100$. The point P(6, 8) lies on the circle. Work out the gradient of the tangent at P. **[4 marks]**

Answer _____

10 A circle has equation $x^2 + y^2 = 169$. The point P(12, 5) lies on the circle. Work out the gradient of the tangent at P. **[4 marks]**

Answer _____

Stretch

11 A circle has equation $x^2 + y^2 = 25$. Find the equation of the tangent at P(3, 4). **[5 marks]**

Answer _____

12 A circle has equation $x^2 + y^2 = 25$. Find the equation of the tangent at P(−3, 4). **[5 marks]**

Answer _____

13 A circle has equation $x^2 + y^2 = 25$. Find the equation of the tangent at P(−4, 3). **[5 marks]**

Answer _____

14 A circle has equation $x^2 + y^2 = 25$. Find the equation of the tangent at P(3, −4). **[5 marks]**

Answer _____

15 A circle has equation $x^2 + y^2 = 169$. Find the equation of the tangent at P(5, 12). **[5 marks]**

Answer _____

Challenge

16 Show that the tangent at P(8, 6) to $x^2 + y^2 = 100$ has equation $8x + 6y = 100$. **[6 marks]**

Answer _____

17 A circle has centre (1, 2) and passes through P(-5, 10). Find the equation of the tangent at P. **[6 marks]**

Answer _____

18 Find the equation of the tangent to $x^2 + y^2 = 25$ at (5, 0). **[4 marks]**

Answer _____

19 A circle has centre (2, 1) and passes through P(8, 9). Find the equation of the tangent at P. **[6 marks]**

Answer _____

20 Find the equation of the tangent to $x^2 + y^2 = 169$ at (0, 13). **[4 marks]**

Answer _____