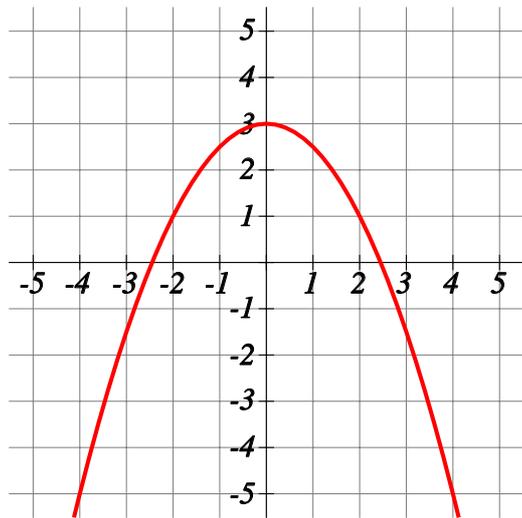


# 7. Differentiation

Name:	Class:	Date:
-------	--------	-------

Mark	/ 20	%
------	------	---

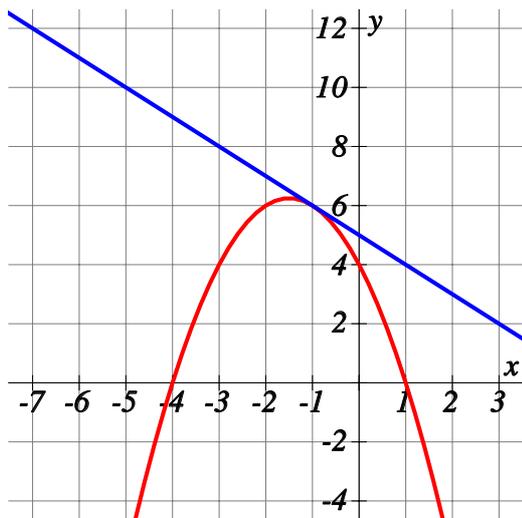
1) Find the gradient at  $x = -2$  by drawing a suitable tangent on the curve.



2) Find the equation of the tangent that meets the curve at  $x = -1$ .

[1]

[1]



**3) Differentiate**

[9]

a)  $f(x) = -17x^2$

b)  $f(x) = \frac{x^5}{x^2}$

c)  $y = 10x^2 + 11x - 1$

d)  $f(x) = -\frac{2}{7}x^{-6}$

e)  $y = \frac{1}{3x^3}$

f)  $f(x) = \frac{1}{4x^4} - 2\sqrt[4]{x}$

g)  $f(x) = \frac{9x - x^4}{x}$

h)  $f(x) = 3x^3(4x^3 + x)$

i)  $R = 8\pi r$

**4) Find the gradient of the curve whose equation is**

[1]

$f(x) = 5 + 2x^2$  at the point (4,37)

**5) Find the coordinates of the point on the curve  $y = 1 + 13x - 5x^2$  where the gradient is -7**

[1]

**6) Find the gradient of the curve whose equation  $y = f(x)$  at the point G where**

[1]

$f(x) = 4x^{-5} + 4x^2$  and G is at (1,8)

**7) Find the point(s) on the curve with equation  $y = f(x)$  where the gradient is zero.**

[1]

$y = 5 + 14x - 7x^2$

**8) Find the gradient of the curve whose equation  $y = f(x)$  at the point N where**

[1]

$f(x) = \frac{3 - 10x}{x^2}$  and N is at (-3, 0)

9) Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  of the following [1]

$$y = \frac{12}{x^2} + \sqrt{x}$$

10) Find the equation of the tangent to the curve [1]

$$y = 4x - \frac{18}{x} \text{ at the point } (3,6)$$

11) Find the equation of the normal to the curve [1]

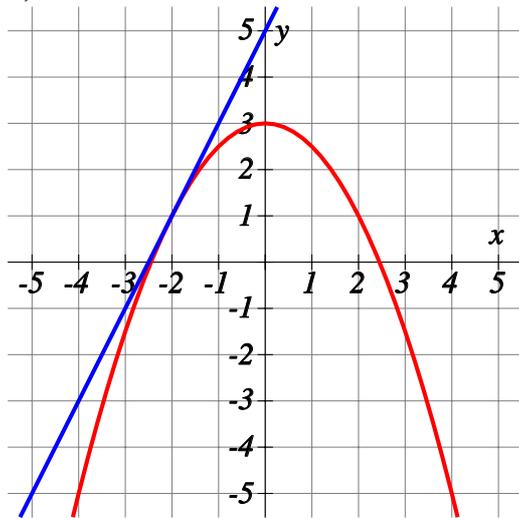
$$y = 2x - \frac{27}{x} \text{ at the point } (-9,-15)$$

12) Find the coordinates of the point where the tangent to the curve  $y = 8x^2 - 26x + 3$  at the point  $(2,-17)$  meets the normal to the same curve at the point  $(0,3)$ .

[1]

## Solutions for the assessment 7. Differentiation

1)



Gradient = 2

2)  $y = -x + 5$

3) a)  $f'(x) = -34x$

b)  $f'(x) = 3x^2$

c)  $\frac{dy}{dx} = 20x + 11$

d)  $f'(x) = \frac{12}{7}x^{-7}$

e)  $\frac{dy}{dx} = -\frac{1}{x^4}$

f)  $f'(x) = -\frac{1}{x^5} - \frac{1}{2}x^{-\frac{3}{4}}$

g)  $f'(x) = -3x^2$

h)  $f'(x) = 72x^5 + 12x^3$

i)  $\frac{dR}{dr} = 8\pi$

4) The gradient at the point (4,37) is 16

5) (2,7)

6) The gradient at the point G is -12

7) (1,12)

8) The gradient at the point N is  $\frac{4}{3}$

9)  $\frac{dy}{dx} = -\frac{24}{x^3} + \frac{1}{2}x^{-\frac{1}{2}}$  and  $\frac{d^2y}{dx^2} = \frac{72}{x^4} - \frac{1}{4}x^{-\frac{3}{2}}$

10) The tangent at the point (3,6) is  $y = 6x - 12$

11) The normal at the point  $(-9, -15)$  is  $y = -\frac{3}{7}x - \frac{132}{7}$     12) The coordinates are  $(\frac{832}{155}, \frac{497}{155})$