

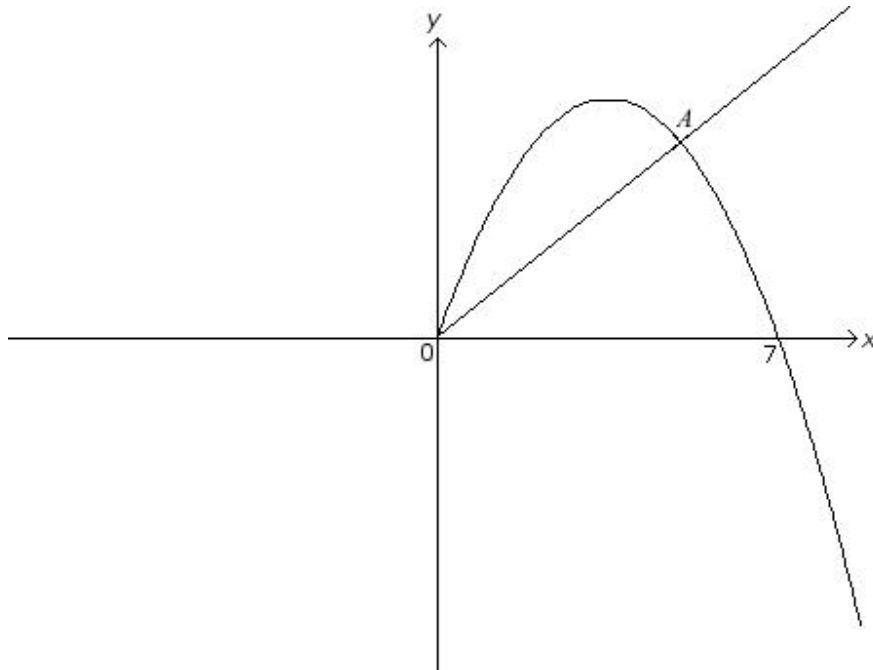
INTENSIVE REVISION QUESTIONS (ERQ)
SET 14-INTEGRATIONS

Name :

Form :

Teacher:

1.



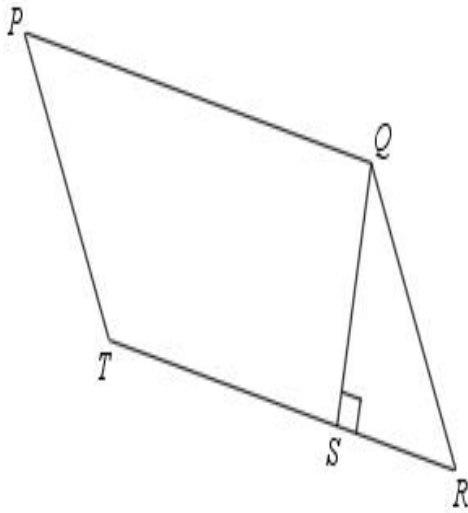
The diagram above shows the curve $y = x(7 - x)$ and the straight line $y = 2x$.

Find

- (a) the coordinates of point A ,
- (b) the area of the region bounded by the curve and the straight line. [10 marks]
2. Given that $\int_{-5}^{-3} f(x) dx = 3$, find the value of $\int_{-5}^{-3} [9f(x) + 2x] dx$. [5 marks]
3. The gradients of the tangents to two curves are $4 + 4x$ and $mx + 4$ respectively. If the two curves intersect at a right angle at point $(2, 3)$, find
- (a) the value of m ,
- (b) the equations of the two curves. [8 marks]
4. Given that $\int (px^q - 2x) dx = 10x^9 - rx^2 + c$, find the values of p , q and r . [5 marks]

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5.



The diagram above shows the curve $y = 3x^2 + 3$.

Given that the area of the shaded region is 50 unit^2 , find

(a) the value of h ,

(b) the volume of revolution, in terms of π , when the shaded region is rotated completely about the x -axis. [10 marks]

6. Given that $\int (px^q - 12x) dx = 9x^9 - rx^2 + c$, find the values of p , q and r . [5 marks]

7. Find the equation of the curve that has a gradient of $(4x + 1)^2$ and passes through the point $\left(\frac{1}{4}, \frac{14}{3}\right)$. [5 marks]

8. Find the equation of the curve that has a gradient of $(4x + 1)^2$ and passes through the point $\left(\frac{1}{4}, \frac{8}{3}\right)$. [5 marks]

9. The gradient function of a curve is given by $\frac{dy}{dx} = 3mx^2 - 2x$. Given that $y = 4x + 3$ is the tangent to the curve at point $(1, -3)$, find
 (a) the value of m ,
 (b) the equation of the curve. [6 marks]

10. Given that $\frac{d^2y}{dx^2} = 72x^2 + 16$, express y in terms of x if $y = 23$ and $\frac{dy}{dx} = 44$ when $x = 1$. [5 marks]

11. Given that $\int^{-3} f(x) dx = 1$, find the value of $\int^{-3} [3f(x) + 6x] dx$. [5 marks]

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12. The gradients of the tangents to two curves are $4 + 2x$ and $mx + 2$ respectively. If the two curves intersect at a right angle at point $(2, 5)$, find
- the value of m ,
 - the equations of the two curves.
- [8 marks]

13. Find the integral of each of the following.

(a) $\int \frac{(9+x)(9-x)}{x^2} dx$

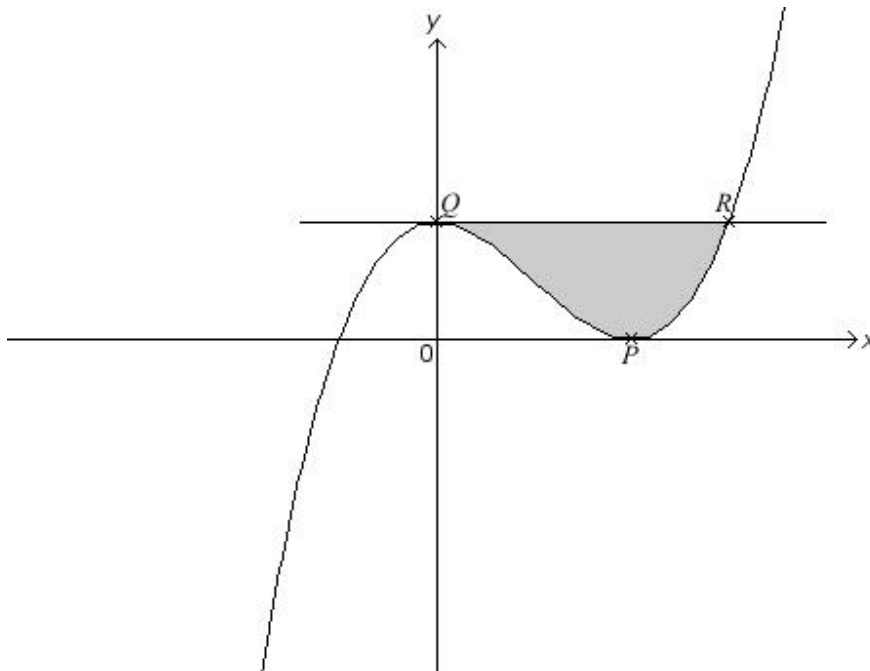
(b) $\int \frac{9}{(2x-12)^8} dx$

[6 marks]

14. Given that $\frac{d^2y}{dx^2} = 84x^2 + 16$, express y in terms of x if $y = 5$ and $\frac{dy}{dx} = 6$ when $x = 0$.
- [5 marks]

15. Given that $\frac{d^2y}{dx^2} = 120x^3 + 12$, express y in terms of x if $y = 6$ and $\frac{dy}{dx} = 6$ when $x = 0$.
- [5 marks]

- 16.



The diagram above shows the graph of $y = g(x)$ which touches the x -axis at point P . Point Q is the turning point of the graph which occurs on the y -axis. The straight line QR is parallel to the x -axis and $g'(x) = 9x^2 - 18x$. Find

- the coordinates of point P ,
- $g(x)$,
- the coordinates of point Q ,
- the coordinates of point R ,

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(e) the area of the shaded region. [10 marks]

17. Find the integral of each of the following.

(a) $\int \frac{(11+x)(11-x)}{x^2} dx$

(b) $\int \frac{11}{(2x-7)^9} dx$ [6 marks]

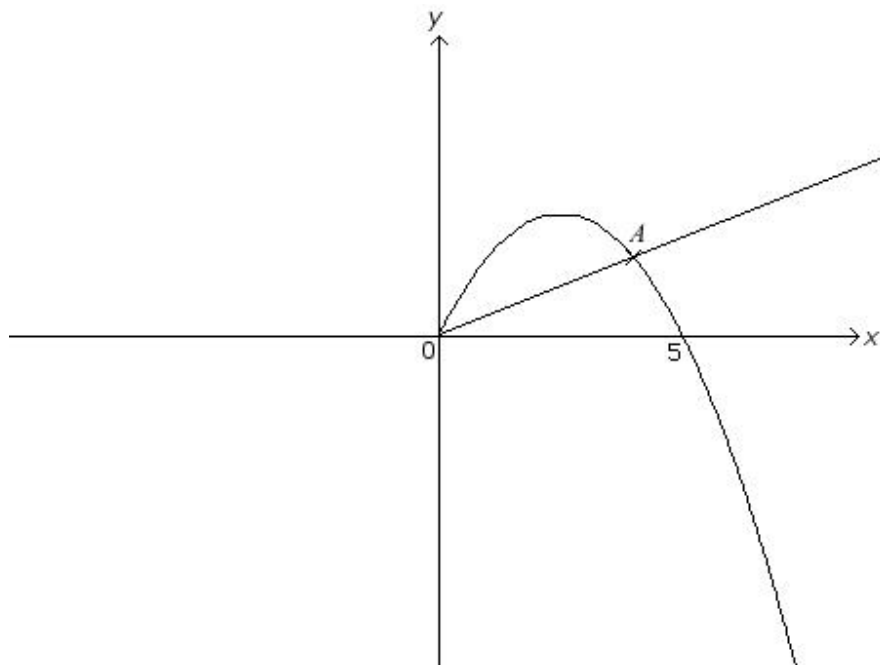
18. The gradient function of a curve is given by $\frac{dy}{dx} = 3mx^2 - 2x$. Given that $y = 7x + 12$

is the tangent to the curve at point $(1, 7)$, find

(a) the value of m ,

(b) the equation of the curve. [6 marks]

19.



The diagram above shows the curve $y = x(5 - x)$ and the straight line $y = x$.

Find

(a) the coordinates of point A ,

(b) the area of the region bounded by the curve and the straight line. [10 marks]

20. Given that $\int_0^6 f(x) dx = 9$, find the value of $\int_0^6 [9f(x) + 6x] dx$. [5 marks]

Answers:

- (a) $(5, 10)$
(b) 20.83 unit^2
- 11
-

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(a) $\frac{-49}{24}$

(b) $y = 4x + 2x^2 - 13, \quad y = \frac{-49}{48}x^2 + 4x - \frac{11}{12}$

4. $p = 90, \quad q = 8, \quad r = 1$

5. (a) $h = 3, \quad 750.00\pi \text{ unit}^3$

6. $p = 81, \quad q = 8, \quad r = 6$

7.

$$\frac{(4x+1)^3}{12} + 4$$

8.

$$\frac{(4x+1)^3}{12} + 2$$

9. (a) $m = 2, \quad$ (b) $y = 2x^3 - x^2 - 4$

10. $y = 6x^4 + 8x^2 + 4x + 5$

11. -18

12.

(a) $\frac{-17}{16}$

(b) $y = 4x + x^2 - 7, \quad y = \frac{-17}{32}x^2 + 2x + \frac{25}{8}$

13.

(a) $\frac{81}{-x} - x + c$

(b) $\frac{9}{-14(2x-12)^7} + c$

14. $y = 7x^4 + 8x^2 + 6x + 5$

15. $y = 6x^5 + 6x^2 + 6x + 6$

16. (a) $P = (2, 0)$

(b) $g(x) = 3x^3 - 9x^2 + 12$

(c) $Q = (0, 12)$

(d) $R = (3, 12)$

(e) 20.25 unit^2

17.

(a) $\frac{121}{-x} - x + c$

(b) $\frac{11}{-16(2x-7)^8} + c$

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18. (a) $m = 3$, (b) $y = 3x^3 - x^2 + 5$
19. (a) (4, 4)
(b) 10.67 unit²
20. 189

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