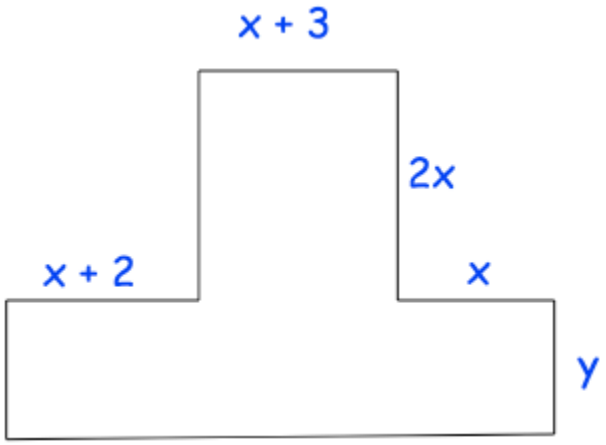
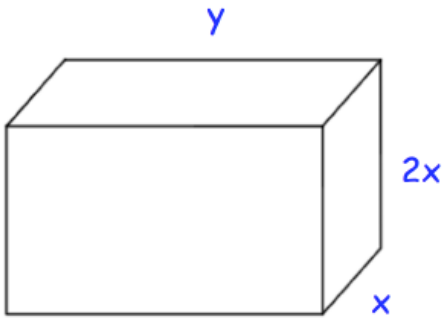
REVISION QUESTIONS
TOPIC: DIFFERENTIATION
EDITION ONE

1. A curve has its equation as $y = x^2 + 6x - 3$. Find the equation of the tangent to the curve at the point (1, 4). Give your answer in the form y = mx + c, where m and c are constants.
2. The shape below is made from two rectangles. The perimeter of the shape is 120cm and the area is A cm^2.



   a) Express the area A of the shape in terms of x only.
   b) Find the value of x for which A is maximum
3. Find the gradient of the normal to the curve $y = x^2 + 2x$ at the point (1, 3)
4. Determine the equation of the tangent to the curve $y = x^3 + 4x^2 + x$ at the point (–1, 2)
5. Determine the equation of the normal to the curve $y = 2x^2 - 4x + 3$ at the point (2, 3). Give your answer in the form y = mx + c.
6. A curve has its equation as $y = x^2 - 4x + 21$
   a) Determine the gradient function of the curve
   b) Determine the coordinates of the stationary point of the curve and state its nature
7. Determine the equation of the normal to the curve $y = (x+1)(x+7)$ at the point where x = –5.
8. The line L is tangent to the curve $y = 2x^2 - 3x + 1$ at the point (3, 10). Determine the equation of L in the form y = mx + c.
9. The surface area of the solid cuboid below is 120cm^2. The dimensions of the cuboid are as shown.



   a) Express the volume of the cuboid in terms of x only
   b) Hence find the value of x for which the volume of the cuboid will be maximum.
10. Determine the coordinates of the stationary points of the curve $y = x^3 - 3x + 1$ and hence state their nature.
11. A curve whose equation is $y = \frac{2}{3}x^3$, has a gradient of 18 at points P and Q. Determine the coordinates of P and Q.

12. A point A lies on the curve $y = x^2 + 2x + 10$, If the x-coordinate of A is –5, find the equation of the normal to the curve at A.

13. Given that $y = 6x^7 - \frac{4}{x^3}$, find $\frac{dy}{dx}$

14. Determine the coordinates of the stationary points of the curve $y = -x^3 + 12x^2 - 36x$ and hence state their nature.

15. Given that $y = \frac{3}{x^2}$, find $\frac{dy}{dx}$

16. The gradient of the curve whose equation is $y = (x+2)(x-3)$ at the point P is –4. Determine the coordinates of P

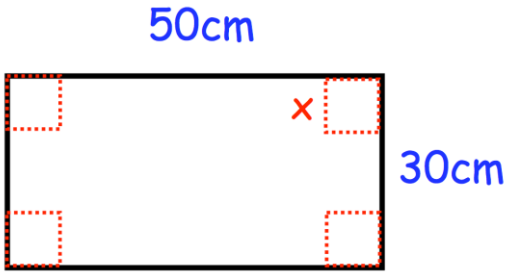
17. The equation of a curve is given as $y = 4x^2 + 2x - 3$. A normal to the curve is drawn at the point A. The normal drawn is parallel to the line whose equation is $x - 6y = 6$. Find the equation of the normal at the point A, giving your answer in the form y = mx + c.

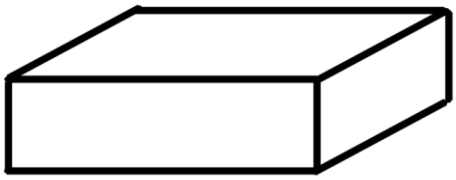
18. The equation of a curve is given as $y = \frac{1}{3}x^3 - 2x^2 - 10x + 4$. The curve passes through the point $P(-3, 7)$ and the point Q. The tangent to the curve drawn at Q is parallel to the tangent to the curve drawn at P. Find the x-coordinate of point Q.

19. Given that $y = \frac{7x(x^3 - 2x)}{x^2}$, find $\frac{dy}{dx}$

20. Determine the coordinates and the nature of the turning points of the curve whose equation is $y = \frac{1}{3}x^3 + 5x^2 + 21x + 3$.

21. A rectangular sheet of metal measures 50cm by 30cm. Four squares of side x cm are cut from each corner and the remaining card is folded to form a cuboid shaped tray.





a) Determine the dimension of the tray in terms of x
b) Express the volume V of the tray in terms of x
c) Find the value of x for which the volume V is a maximum
d) Find the maximum volume V.

22. The gradient of the curve $y = x^2 - 7x$ at the point P is 1. Find the coordinates of P.

23. The equation of a curve is given as $y = 4x^2 + 2x - 3$. A normal to the curve is drawn at the point A. The normal drawn at A is parallel to the line whose equation is $x - 6y = 6$. Find the equation of the tangent at the point A, giving your answer in the form y = mx + c.

24. Given that $y = \frac{4}{5}x^{10} + 2x^7 + \frac{4}{x^3}$, find $\frac{dy}{dx}$

25. Determine the coordinates of the stationary points of the curve $y = 4x^3 - 15x^2 - 18x + 2$ and hence state their nature.