IGCSE Revision 3

1. Factorise

   (a) $2ax + 2ay + 3x + 3y$, $\boxed{(x+y)(2a+3)}$

   (b) $12x^2 + 2x - 30$. $\boxed{2(2x-3)(3x+5)}$

2. Complete the square on $x^2 + 3x - 1$. Hence give the vertex of $y = x^2 + 3x - 1$.

   $\boxed{y = (x + \frac{3}{2})^2 - \frac{13}{4},\ \text{Vertex} = (-\frac{3}{2}, -\frac{13}{4})}$

3. Find the x^3 coefficient in the expansion of $(2x^2 + 3x + 1)(x^4 + 3x^3 - 2x^2 + x - 3)$.

   $\boxed{-1}$

4. A cubiodal box of cereal has volume 420ml. A sticker talking about the benefits of the cereal has area 40cm^2. A new, mathematically similar, larger box of cereal is introduced with volume 725.76ml. What would the area of the new sticker be? $\boxed{57.6}$

5. A cubiodal box of cereal has volume v. A sticker talking about the benefits of the cereal has area a. A new, mathematically similar, larger box of cereal is introduced with volume V. What would the area (A) of the new sticker be? $\boxed{a\left(\frac{V}{v}\right)^{\frac{2}{3}}}$

6. Simplify fully $\dfrac{8x^2 - 18}{6x + 9}$. $\boxed{\frac{2(2x-3)}{3}}$

7. Two shapes are mathematically similar. The base on the smaller one is 3.2cm. If the surface area of the larger one is 84cm^2 and the surface area of the smaller one is 21cm^2. What is the length of the base on the larger one? $\boxed{6.4}$

   If the volume of the larger one is V, find an expression for the volume of the smaller one. $\boxed{\frac{V}{8}}$

8. For the following, find $\frac{dy}{dx}$:

   (a) $y = 3x^4 - 2\sqrt{x}$. $\boxed{\frac{dy}{dx} = 12x^3 - x^{-\frac{1}{2}}}$

   (b) $y = \frac{1}{x} - \frac{3}{x^2} + \frac{7x}{3x^7}$. $\boxed{\frac{dy}{dx} = -x^{-2} + 6x^{-3} - 14x^{-7}}$

   (c) $y = \frac{1-\sqrt{x}}{x}$. $\boxed{\frac{dy}{dx} = -x^{-2} + \frac{x^{-\frac{3}{2}}}{2}}$

9. A closed cylinder of length l and radius r has a hemisphere of radius r glued to one end. Find a simplified expression for

   (a) its volume, $\boxed{\frac{\pi r^2(3l+2r)}{3}}$

   (b) its surface area. $\boxed{\pi r(3r+2l)}$

10. A car is reduced in a sale by 14%. Its sale price is 1357.08 GBP. What was its original price? $\boxed{1578}$

11. I flick a bias coin 5 times. The probability of a head is 0.7. What is the probability of exactly 3 heads from my 5 throws (in any order)? $\boxed{0.3087}$

12. Power P is inversely proportional to the square of time t.

(a) If $P = 10$ when $t = 2$ find and expression for P in terms of t. $\boxed{P = \frac{40}{t^2}}$

(b) Sketch P against t for $t > 0$.

(c) Find t when $P = 30$. $\boxed{1.1547 \text{ (to 5 sig figs)}}$