Autumn Term Review Sheet 1

1. Multiply out and simplify:

   (a) $(x+3)^2 + (2x-1)^2$. $\boxed{5x^2 + 2x + 10}$

   (b) $(2a+b)^2 + (a+3b)^2$. $\boxed{5a^2 + 10ab + 10b^2}$

   (c) $(x-y)^2 - (x+y)(x-2y)$. $\boxed{3y^2 - xy}$

2. Solve the following equations:

   (a) $(x-3)(x-2) = 0$. $\boxed{x = 3 \text{ or } x = 2}$

   (b) $(3-x)(x+7) = 0$. $\boxed{x = 3 \text{ or } x = -7}$

   (c) $x^2 + x - 12 = 0$. $\boxed{x = -4 \text{ or } x = 3}$

   (d) $3x^2 - 7 = 2x^2 + 6x$. $\boxed{x = 7 \text{ or } x = -1}$

   (e) $(x+1)(x-3) = 2x - 3$. $\boxed{x = 0 \text{ or } x = 4}$

   (f) $(2x-1)(x-1) = (x-3)(x-5)$. $\boxed{x = 2 \text{ or } x = -7}$

   (g) $\begin{array}{l} 3x + 4y = 5 \\ 5x - 2y = 4 \end{array}$. $\boxed{x = 1, y = \frac{1}{2}}$

3. Make the underlined letter the subject of the following formulae:

   (a) $\frac{a+b}{\underline{c}} = \frac{d}{e}$. $\boxed{c = \frac{e(a+b)}{d}}$

   (b) $V = 2\pi r^2 + 2\pi r\underline{h}$. $\boxed{h = \frac{V - 2\pi r^2}{2\pi r}}$

   (c) $a\underline{x} + b\underline{x} = c\underline{x} + dy$. $\boxed{x = \frac{dy}{a+b-c}}$

4. Write the following as single fractions (remember; if you are unsure try it with numbers first):

   (a) $\frac{a}{b} + \frac{c}{d}$. $\boxed{\frac{ad+bc}{bd}}$

   (b) $a + b\frac{c}{d}$. $\boxed{\frac{ad+bd+c}{d}}$

   (c) $\frac{1}{x} - \frac{1}{x+1}$. $\boxed{\frac{1}{x(x+1)}}$

   (d) $\frac{(a/b)}{c}$. $\boxed{\frac{a}{bc}}$

   (e) $\frac{a}{(b/c)}$. $\boxed{\frac{ac}{b}}$

5. Find the volume and SA of a cylinder with $r = 5$cm and $h = 10$cm. $\boxed{V = 250\pi, SA = 150\pi}$

6. The volume of a cylinder is 100πcm^3. Its length is 4cm. Find its radius. Hence, find its SA. $\boxed{r = 5, SA = 90\pi}$

7. A sector of a circle has area 5πcm^2 and $r = 10$cm. Find its arc length. [Hint: Go from Area to angle to arc length.] $\boxed{\theta = 18°, \text{Arc length} = \pi}$

8. A ship sails 20km on a bearing of $100°$ and then sails 40km on a bearing of $200°$.

   (a) How far east of its original position is the ship? ☐

   (b) How far south of its original position is the ship? ☐

9. A ship sails 20km on a bearing of $100°$ and then sails $x$km on a bearing of $170°$. It ends up 30km east of its original position. Find x. ☐

10. A ship sails 20km on a bearing of 250° and then sails 30km on a bearing of $b°$. It ends up 40km west of its original position. Find b. ☐

11. A sector of a circle with $\theta = 290°$ and $r = 10$cm is folded into a cone and a circular base added. What is the height and radius of the resulting cone? ☐