Perth Academy National 5 Expressions and Formulae Homework 15

- 1. A is the point 3,4 and B is the point 5,10. Find the gradient of AB. A rough sketch will help.
- 2. Repeat question 1 for the following pairs of points.
 - (a) C 2,3 and D 7,18.
 - (b) E 0,3 and F 7,-17.
 - (c) G -1,3 and H 4,0.

4.

3. Find the length of the curved arc in each of these sectors.



5. Calculate the size of angle x° in the sector opposite. The sector has area 20 square cm and radius $5 \cdot 8$ cm.



6. Calculate the volume of the prism sketched below. The cross-section is an equilateral triangle of sides 12 cm.



- 7. (a) A cylinder has radius 5 cm and height 8 cm. Calculate its volume.
 - (b) A second cylinder has radius 3 cm and the same volume as the first cylinder. Calculate the height of the second cylinder.
- 8. (a) A sphere has radius 4 cm. Calculate its volume.
 (b) A cone has height 10 cm and the same volume as the sphere. Calculate the radius of the cone.
- 9. Factorise.

(a)
$$x^2 + x - 20$$
 (b) $k^2 - 25$ (c) $4x^2 - 9y^2$

- (d) $1-16y^2$ (e) $x^2-8x+16$ (f) $2x^2-x-6$
- 10. By first factorising numerator and denominator, simplify each of these fractions:

(a)
$$\frac{3x+6}{x^2-4}$$
 (b) $\frac{a^2-a-6}{2a^2-5a-3}$ (c) $\frac{x+7}{x^2+6x-7}$

- 11. Simplify these surds
 - (a) $\sqrt{12}$ (b) $\sqrt{18}$ (c) $\sqrt{128}$ (d) $\sqrt{108}$ (e) $\sqrt{75}$ (f) $\sqrt{320}$
- 12. Rationalise the denominator
 - (a) $\frac{3}{\sqrt{3}}$ (b) $\frac{15}{\sqrt{5}}$ (c) $\frac{27}{\sqrt{3}}$

13. (a) Express
$$x^2 - 6x + 13$$
 in the form $x - a^2 + b$

- (b) Express $x^2 + 2x + 11$ in the form $x + a^2 + b$
- (c) Express $x^2 8x + 10$ in the form $x a^2 + b$
- (d) Express $x^2 + x + 1$ in the form $x + a^2 + b$
- 14. Multiply out and simplify:

(a)
$$4x-1^2$$
 (b) $3x+1$ $x-3$ $-2x$ $2x-1$

(c)
$$2x-3^2-x+2^2$$
 (d) $x-2x^2-2x+3$