1.   Simplify

(a) $a^5 \times a^3$ (b) $a^6 \div a^{-1}$ (c) $\dfrac{a^4 \times a^3}{a^{-2}}$

(d) $\left(a^3\right)^4$ (e) $\left(\sqrt{x}\right)^6$ (f) $\left(a^{-1}\right)^4$

2.   Evaluate

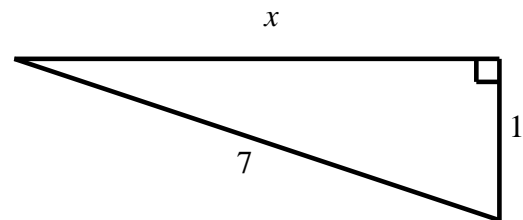(a) 3^4 (b) 4^{-2} (c) $16^{\frac{1}{2}}$

(d) $8^{\frac{2}{3}}$ (e) $27^{\frac{1}{3}}$ (f) $2^{-1} - 3^{-2}$

3.   Find the value of x in the following right-angled triangle.
        Give your answer as a surd in its simplest form.

4.   Simplify   (a) $\sqrt{32} + 2\sqrt{2} - \sqrt{50}$ (b) $\sqrt{2}\ \sqrt{6} - \sqrt{2}$

5.   Express with rational denominators:

(a) $\dfrac{1}{\sqrt{2}}$ (b) $\dfrac{3}{\sqrt{5}}$ (c) $\dfrac{4}{\sqrt{2}}$ (d) $\dfrac{4}{\sqrt{3}}$
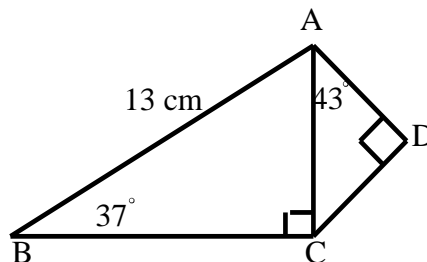
6.   Simplify:

(a) $\left(a^3\right)^4$ (b) $\dfrac{a^2 \times a^{-3}}{a \times a^3}$ (c) $\dfrac{8t^2}{2t^{\frac{1}{2}}}$ (d) $6y^5 \div 2y$

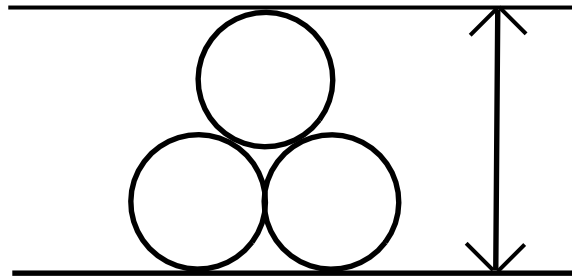7.   Calculate the length of AD.

8.   Solve, leaving your answer as a fraction, if necessary:

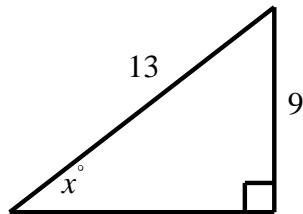(a) $5x - 3 = 2x + 11$ (b) $4x - 7 = x - 10$ (c) $3(1 - x) = 2x$

9. Find the total height of the following stack of touching circles, each with radius 5 units.
[It will help to join the centres.].

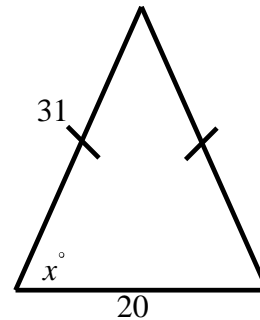10. Find the size of the angle $x°$ in each of these triangles.

(a)
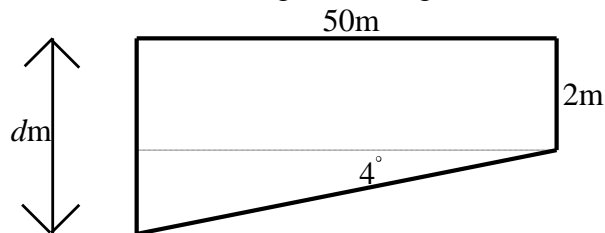
13

9

$x°$

(b)

31

$x°$

20

11. The diagram below shows the cross-section of a swimming pool 50m long. Calculate its maximum depth, d metres, giving your answer correct to 3 significant figures.

50m

dm

2m

4°

12. Rhombus ABCD has diagonal, AC, measuring 16cm and shorter diagonal, BD, measuring 12cm.

(a) Draw a sketch of rhombus ABCD.
(b) Calculate the area of rhombus ABCD.
(c) Calculate the length of a side, and hence the perimeter of the rhombus ABCD.