

1. (i) Given that k is real, find the set of value of k for which the equation $(1+2k)x^2 - 10x + (k-2) = 0$ has real roots.

(ii) Solve the following simultaneous equations for $x, y \geq 0$

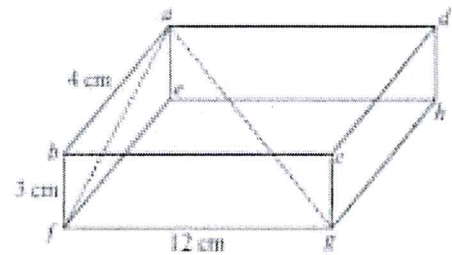
$$2 \log y = \log 2 + \log x \quad \text{and} \quad 2^y = 4^x$$

(iii) Solve the equation $2^{2x+1} - 15(2^x) = 8$

2. The diagram shows a rectangular box. Rectangle $abcd$ is the top of the box and rectangle $efgh$ is the base of the box. $|ab| = 4$ cm, $|bf| = 3$ cm and $|fg| = 12$ cm.

- (i) Find $|af|$.
- (ii) Find $|ag|$.
- (iii) Find the measure of the acute angle between $[ag]$ and $[df]$.

Give your answer correct to the nearest degree.



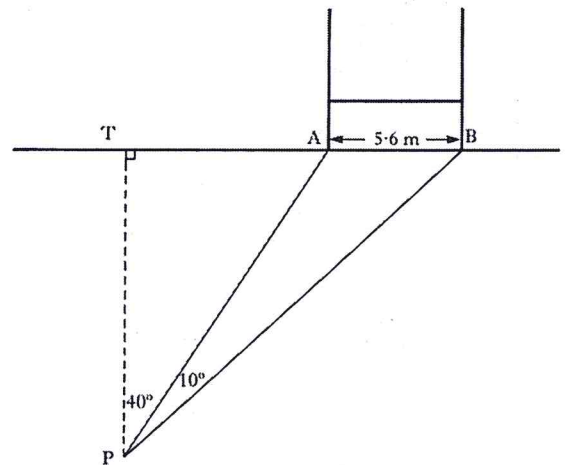
3. A quadratic function has roots 2 and -3. It also contains the point (1, -12). Evaluate the function.

4. The diagram shows the goalposts on a rugby field. To take a kick at goal, a player moves from T to position P . $[TP]$ is perpendicular to $[TB]$.

$$|\angle TPA| = 40^\circ \quad \text{and} \quad |\angle APB| = 10^\circ$$

The distance $|AB|$ between the goal posts is 5.6 metres.

Find the distance from T to P .

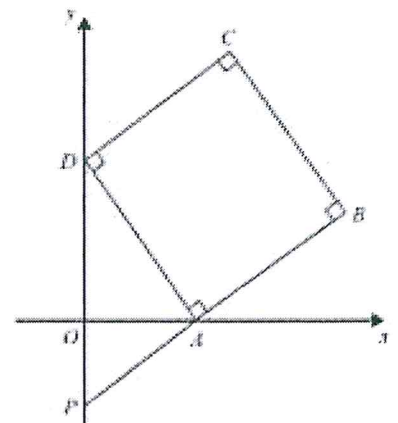


5. (i) Factorise $z^3 - 1$

(ii) Hence, or otherwise, solve the equation $z^3 - 1 = 0$

6. $ABCD$ is a square. P and D are points on the y -axis. A is a point on the x -axis. PAB is a straight line. The equation of the line that passes through the points A and D is $y = -2x + 6$.

Find the length of PD .



Some Answers: [2.] (i) 5 cm (ii) 13 cm (iii) 45° [3.] $f(x) = 3x^2 + 3x - 18$