

Note that these questions are from the Text Book: "Mathematics for Technicians 7th ed"

Q1 Express the following angles in radians, correct to 5 significant figures

a) 23.78°

b) 191.25°

Q2 Convert into degrees:

a) $\pi/2.64$ radians

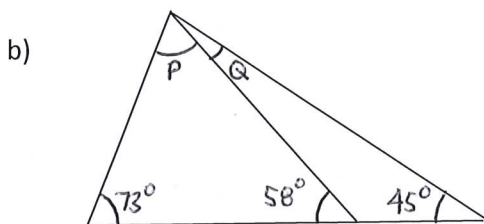
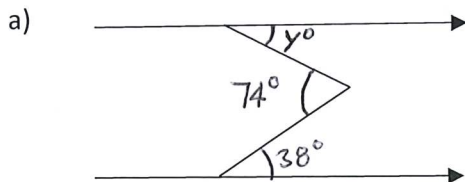
b) 1.863π radians

Q3 Write the:

a) Supplement of $57^\circ 28'$

b) Complement of $43^\circ 47'$

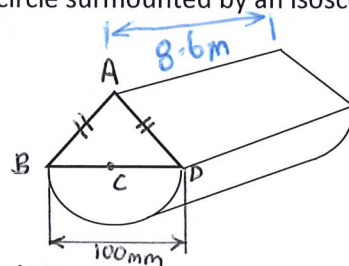
Q4 Evaluate the pronumerals:



Q5 The cross section of this right prism consists of a semi circle surmounted by an isosceles triangle.

Expressing the results to 3 significant figures, find:

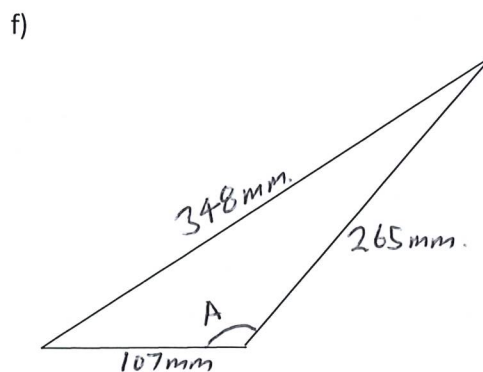
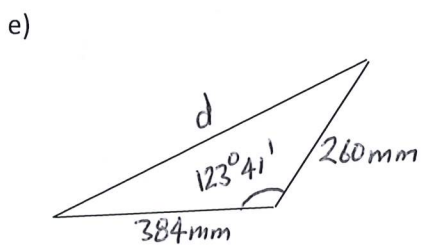
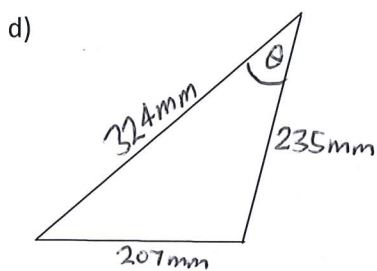
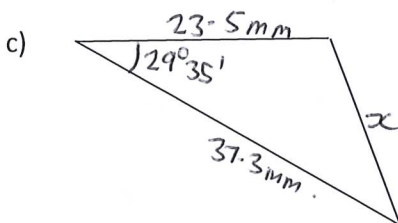
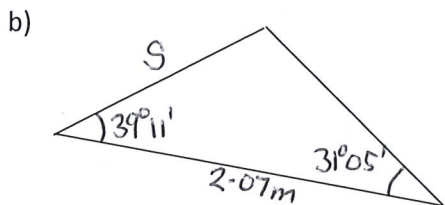
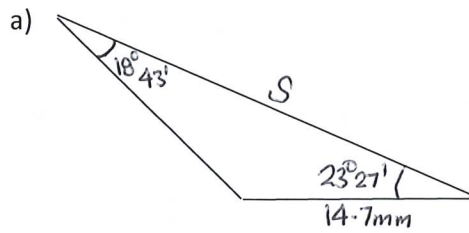
- The length of AB in mm.
- The area of $\triangle ABD$ in square mm.
- The area of the semi circle in square mm
- The volume of the prism in square centimetres
- The exterior surface area of the prism in square meters.



Q6 Evaluate the following:

- In $\triangle KTW$: $\angle T = 90^\circ$, $\angle K = 31^\circ 18'$ and $t = 765m$; evaluate w .
- In $\triangle KTW$: $\angle K = 90^\circ$, $\angle T = 71^\circ 13'$ and $t = 3.28m$; evaluate k .
- In $\triangle ABE$: $\angle E = 90^\circ$, $a = 345m$ and $e = 864m$; evaluate $\angle A$.
- In $\triangle ABE$: $\angle A = 90^\circ$, $b = 34.6mm$ and $e = 51.8mm$; evaluate $\angle B$.

Q7 In each of the triangles below, find the length of the side or angle labelled with the pronumeral:



g) Find the volume of liquid metal required to make 2000 cylindrical roller bearings, each of diameter 4.00mm and length of 12.0mm. The answer is to be in meters cubed (m^3).

Q8. For each of the following straight lines, find:

- i) The gradient
- ii) The x intercept
- iii) The y intercept
- a) $y = 3x - 6$
- b) $5x + 2y + 4 = 0$
- c) $\frac{x-1}{2} = \frac{y+1}{5}$
- d) $\frac{x+1}{y-1} = 5$

Q9 Find the equation for the straight line in *each* case below given:

- a) The gradient is 2 and the line contains the point $(-1,3)$
- b) The x intercept is 4 and the gradient is -3
- c) The line contains the point $(2,-5)$ and the y intercept is -2
- d) The line passes through the points $(2, -1)$ and $(-2,3)$
- e) The gradient is -3 and the line contains the point $(-1,-3)$
- f) The x intercept is -2 and the y intercept is 5.

Q10. On the same axis on graph paper, for $0 \leq x \leq 5$, plot the graphs of simultaneous equations (graphical solution required, not analytical):

$$y = 12x + 20$$

$$y = 80 - 16x$$

Q11.

- a) Solve using the substitution method:

$$6k - 4m = 3$$

$$3k - m = 1$$

- b) Solve using the elimination method:

$$7F - 5m + 39 = 0$$

$$14F + 3m + 13 = 0$$

Q12. In each case below, the coordinates of two points are given. State (i) the distance between the two points, and (ii) the co-ordinates of the mid-point

- a) $A(2,3)$ and $B(5,7)$
- b) $P(3,4)$ and $Q(8, 16)$

Q13. Solve for the pronumeral:

a) $0.3R - 0.06R^2 = 0$

b) $y = x^2 - 12x + 27$ and $y = x + 5$

Q14. For the pair of simultaneous equations below, plot on the axes an accurate graph (on graph paper) of each of the functions and hence find the approximate values of the solutions. Note, this is a graphical solution and the quadratic equation is not required. Note that a) and b) are two separate questions and each will need its own calculations and graph.

a) $y = x^2 - 4x - 12$ and $y = -3x + 5$

b) $y = x^2 - 2x - 3$ and $2y - x + 2 = 0$

Q15. The following data set describes a population (in this case the size shaft diameters supplied from a machine shop). Calculate the mean, mode, median, range, variance and standard deviation. State your answers to one decimal place.

a) Range of diameters provided: 22.1, 22, 19.5, 19.2, 20, 22