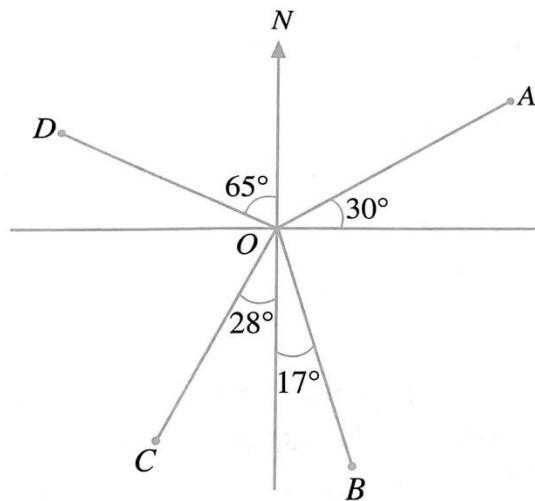


Topical Worksheet: Applications of Trigonometry
Secondary 3 Mathematics

BASIC

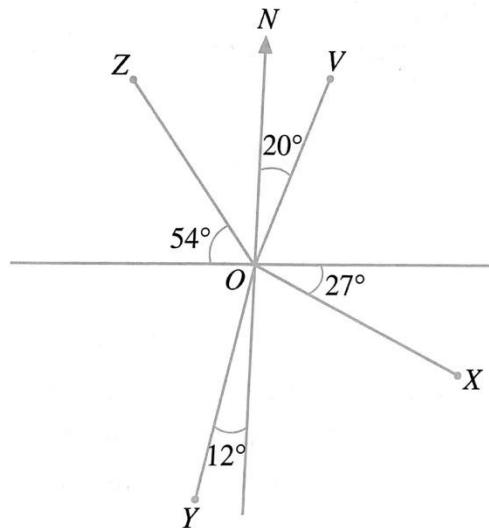
1. Refer to the diagram. State the bearing of

- (a) A from O ,
- (b) B from O ,
- (c) C from O ,
- (d) D from O .



2. Refer to the diagram. State the bearing of

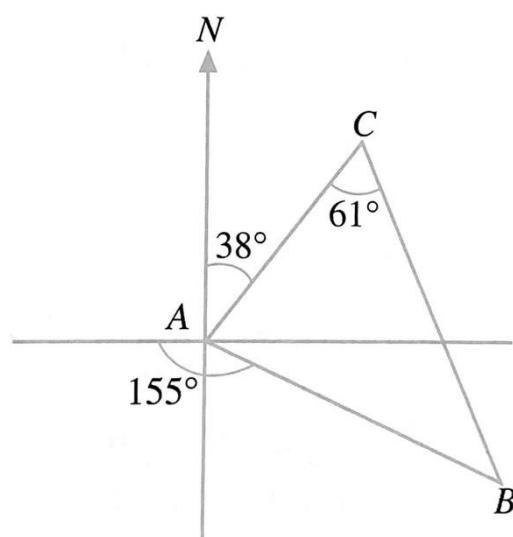
- (a) O from V ,
- (b) O from X ,
- (c) O from Y ,
- (d) O from Z .



3. In the diagram, A , B and C are the relative positions of the three community clubs.

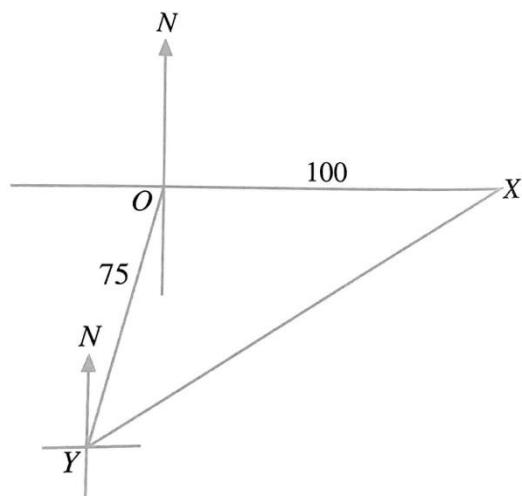
Find the bearing of

- (a) A from C ,
- (b) B from C ,
- (c) A from B .



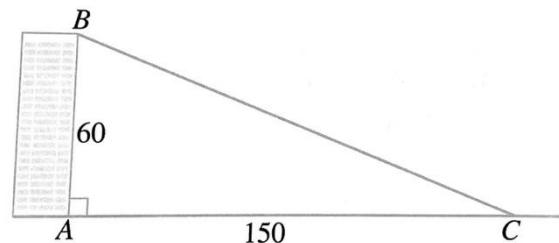
4. In the diagram below, X is 100 m due East of O ,
the bearing of O from Y is 015° and $OY = 75$ m.

- (a) Find the distance XY .
- (b) Find $\angle OXY$.
- (c) State the bearing of Y from X .



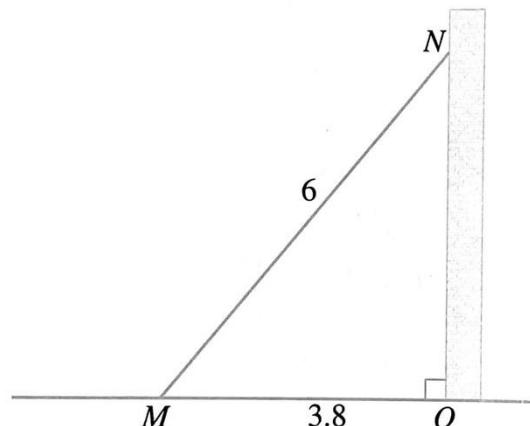
5. A car C is parked 150 m away from a building of AB of height 60 m.

- (a) Find the distance BC .
- (b) Find the angle of elevation of the top of the building from the car.



6. In the diagram, a ladder MN of length 6 m is leaning against a vertical wall. Suppose that the distance between the foot M of the ladder and the foot O of the wall is 3.8 m.

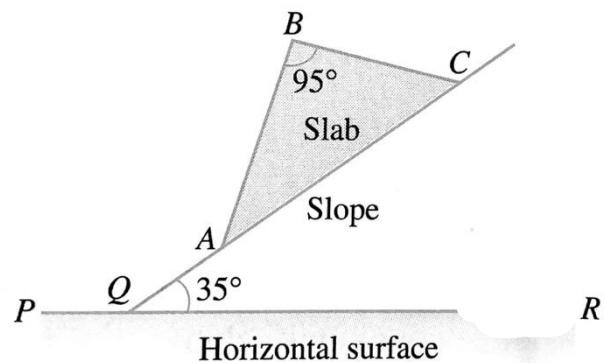
- (a) Find the distance ON .
- (b) Find the angle of depression of M from N .



7. In the diagram, a triangular slab ABC is resting on a slope which is inclined at an angle of 35° to the horizontal surface PQR . The angle of elevation of B from A is 75° and $\angle ABC$ is 95° .

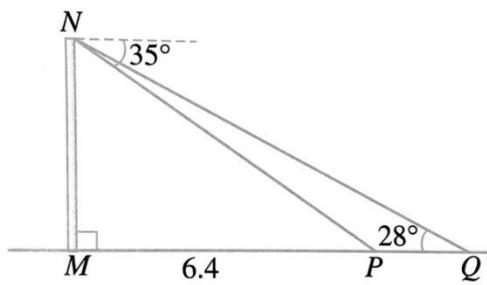
Find

- (a) $\angle BCA$,
- (b) the angle of depression of C from B .



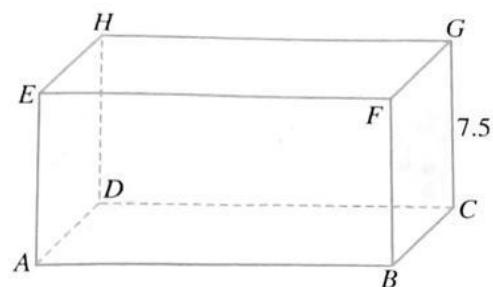
8. In the diagram, MN is a mast. P and Q are two spots on the ground such that M, P and Q form a straight line. $MP = 6.4$ m, the angle of depression of P from the top N of the mast is 35° and the angle of elevation of N from Q is 28° .

- (a) Find the height of the mast.
 (b) Find the distance PQ .



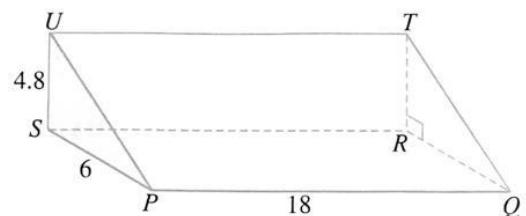
9. In the diagram, $ABCDEFGH$ is a cuboid, $CG = 7.5$ cm and $AB : BC = 5 : 1$.

- (a) Find the lengths of AB and BC if the area of $ABCD$ is 45 cm^2 .
 (b) Find the length of
 (i) CF ,
 (ii) DF .
 (c) Find
 (i) $\angle CDF$,
 (ii) $\angle FDH$.



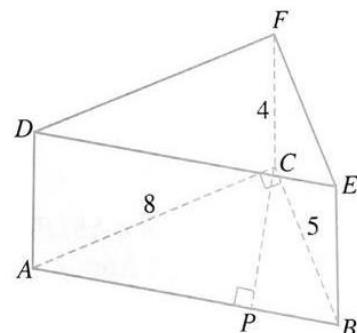
10. The diagram shows a triangular prism in which $\angle QRT = 90^\circ$, $US = 4.8$ cm, $SP = 6$ cm and $PQ = 18$ cm. Find

- (a) the length of RP ,
 (b) the length of PT ,
 (c)
 (d) $\angle RPT$.



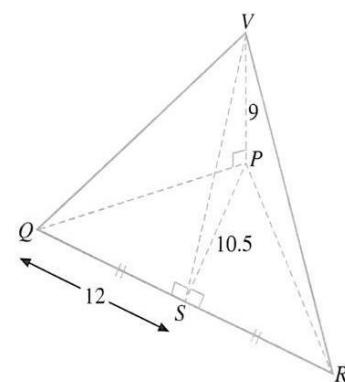
11. In the diagram, $ABCDEF$ is a prism and P is a point on AB . $AC = 8$ cm, $BC = 5$ cm, $CF = 4$ cm and $\angle ACB = \angle APC = 90^\circ$.

- (a) Find the area of $\triangle ABC$.
 (b) Find the length of
 (i) AB ,
 (ii) CP ,
 (iii) FP .
 (c) Hence, find $\angle CPF$.



12. The diagram shows a pyramid $VPQR$. $QS = RS = 12$ cm, $PS = 10.5$ cm, $PV = 9$ cm and $\angle RSP = \angle QSV = \angle QPV = \angle RPV = 90^\circ$.

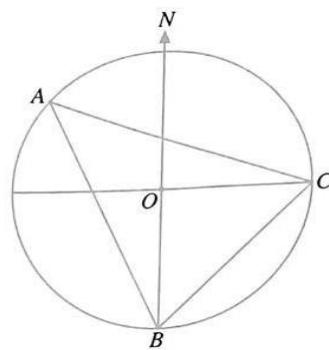
- (a) Find the length of
 (i) SV ,
 (ii) QV .
 (b) Find
 (i) $\angle PSV$,
 (ii) $\angle QVR$



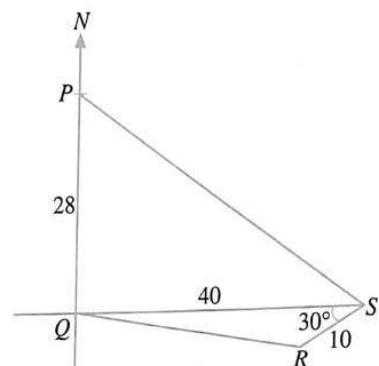
13. A circle with centre O is drawn on level ground. The points A, B and C are three points on the

circumference of the circle. C is due east of O , B is due south of O and the bearing of A from B is 340° . Find the bearing of

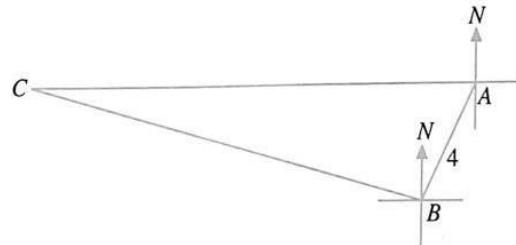
- B from C ,
- C from A .



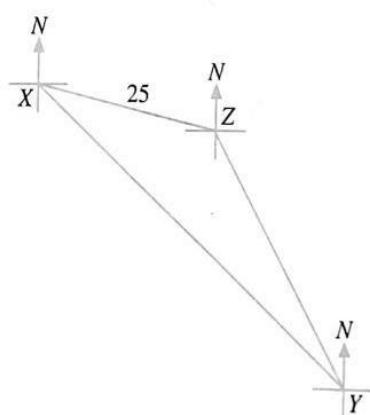
14. P, Q, R and S are four points on level ground. P is 28 m due north of Q , S is 40 m due east of Q , $RS = 10$ m and $\angle QSR = 30^\circ$. Find
- the distance QR ,
 - the bearing of Q from R ,
 - the perimeter of $PQRS$
 - the area of $PQRS$.



15. In the diagram, AB, BC and AC are straight roads. The bearing of B from A is 206° , the bearing of C from B is 285° , A is due east of C and $AB = 4$ km. To avoid the toll of using the road AC , Mr Lee, who wanted to reach C from A , drove his car from A to B and then from B to C .
- Find $\angle ACB$.
 - Calculate the extra distance travelled compared with the direct trip along AC .
 - Find the perpendicular distance from B to AC .

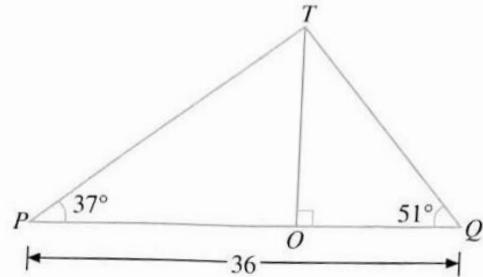


16. In the diagram, X, Y and Z are three shops on the same level of a shopping mall. The bearing of Y from X is 131° , the bearing of Z from X is 103° , the bearing of Z from Y is 330° and $XZ = 25$ m.
- Find $\angle XZY$.
 - Find the distance YZ .
 - Suppose that Joanna walks directly from X to Y and she is closest to Z at the point W . Calculate the distance
- WY ,



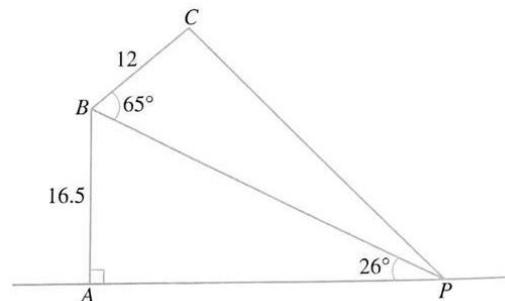
(ii) WZ.

17. In the diagram, OT is a tree and P and Q are two spots on the ground such that P, O and Q form a straight line. The angles of elevation of the highest point T of the tree from P and Q are 37° and 51° respectively and the distance PQ is 36 m. Calculate the height OT of the tree.



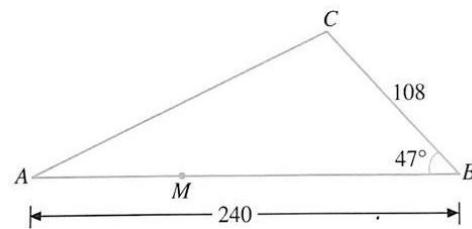
18. In the diagram, A and P are on level ground. ABC is part of a tower such that $AB = 16.5$ m, $BC = 12$ m and $\angle CBP = 65^\circ$.

- Find the distance AP .
- How high above the ground is the point C ?
- Find the angle of depression of P from C .



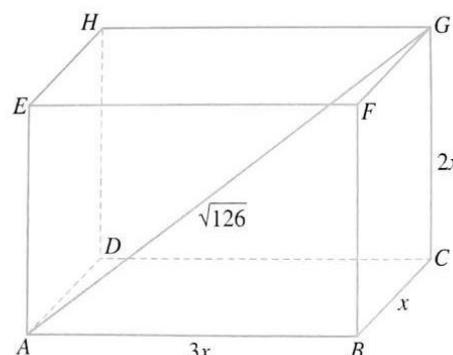
19. In the diagram, A, B and C are the relative positions of three buildings that are built on level ground. $BA = 240$ m, $BC = 108$ m and $\angle ABC = 47^\circ$. The entrance of an MRT station M is located along AB and is such that $AM:AB = 7:20$.

- Find the distance MC .
- Calculate the angle of depression of M from the top of the building at C if the height of the building is 45 m.



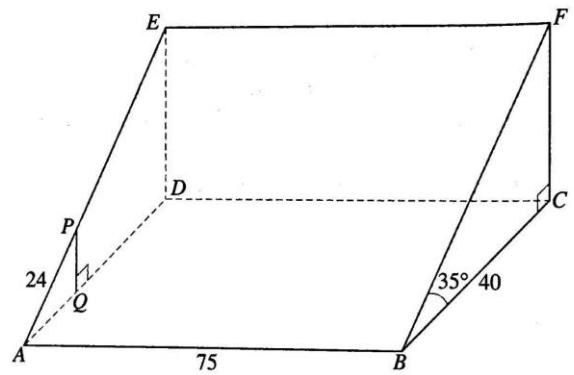
20. In the diagram, $ABCDEFGH$ is a solid cuboid, $AB = 3x$, $BC = x$ cm, $CG = 2x$ cm and $AG = \sqrt{126}$ cm.

- Express the length of AC in terms of x .
- Find $\angle CAG$.
- Form an equation in x and solve it.
- Hence, find the volume and surface area of the cuboid.



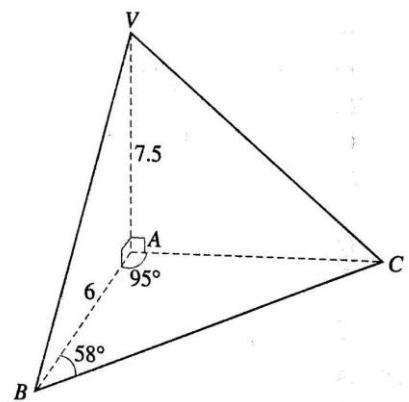
21. The diagram shows a wooden ramp $ABCDEF$ in which $\angle BCF = 90^\circ$ and $\angle CBF = 35^\circ$. $ABCD$, $CDEF$ and $ABFE$ are rectangles, $AB = 75$ cm and $BC = 40$ cm. P is a point on AE such that $AP = 24$ cm and Q is a point on AD such that $\angle PQD = 90^\circ$.

- (a) Find the length of
 - (i) BP ,
 - (ii) FP .
- (b) Find
 - (i) $\angle PBQ$
 - (ii) $\angle BPF$.
- (c) Calculate the area of $\triangle BPF$.



22. In the diagram, $\triangle ABC$ is the base and AV is the height of a solid triangular pyramid $VABC$. $AB = 6$ cm, $AV = 7.5$ cm, $\angle ABC = 58^\circ$ and $\angle BAC = 95^\circ$.

- (a) Find the area of $\triangle ABC$.
- (b) Find the volume of $VABC$.
- (c) Find the total surface area of $VABC$.
- (d) Find $\angle ADV$, where D is the midpoint of BC .



ANSWERS

- 1.** (a) 060° (b) 163° (c) 208° (d) 295°
- 2.** (a) 200° (b) 297° (c) 012° (d) 144°
- 3.** (a) 218° (b) 157° (c) 295°
- 4.** (a) 140 m (b) 31.2° (c) 238.8°
- 5.** (a) 162 m (b) 21.8°
- 6.** (a) 4.64 m (b) 50.7°
- 7.** (a) 45° (b) 10°
- 8.** (a) 4.48 m (b) 2.03 m
- 9.** (a) $AB = 15 \text{ cm}$, $BC = 3 \text{ cm}$
(b)(i) 8.08 cm (ii) 17.0 cm
(c)(i) 28.3° (ii) 63.9°
- 10.** (a) 19.0 cm (b) 19.6 cm (c) 14.2°
- 11.** (a) 20 cm^2
(b)(i) 9.43 cm (ii) 4.24 cm (iii) 5.83 cm
(c) 43.3°
- 12.** (a)(i) 13.8 cm (ii) 18.3 cm
(b)(i) 40.6° (ii) 81.9°
- 13.** (a) 225° (b) 115°
- 14.** (a) 31.7m (b) 279.1° (c) 119m (d) 660 m^2
- 15.** (a) 15° (b) 2.72 km (c) 3.60 km
- 16.** (a) 133° (b) 36.1 m
(c)(i) 34.1 m (ii) 11.7 m
- 17.** 16.8 m
- 18.** (a) 33.8 m (b) 24.1 m (c) 44.5°
- 19.** (a) 114 m (b) 21.5°
- 20.** (a) $\sqrt{10} x \text{ cm}$ (b) 32.3° (c) 3
(d) volume = 162 cm^2 , surface area = 198 cm^2

- 21.** (a)(i) 78.7 cm
(b)(i) 10.1°
(c) 1831 cm^2
- (ii) 79.0 cm
(ii) 36.1°

- 22.** (a) 33.5 cm^2 (b) 83.7 cm^3 (c) 158 cm^2 (d) 50.8°