Exercise 1.

(2 points)

Write the equation of each line:

(a) parallel to $y = 2x + 4$ with x-intercept 12
(b) parallel to $3x + 4y = 5$ and through $P = (1, 3)$
(c) perpendicular to $y = \frac{2}{3}x - 1$ with the same x-intercept as $3x - 7y = 21$
(d) perpendicular to $4x - 5y = 20$ with the same y-intercept as $3x + 5y = 15$
(e) parallel to the y-axis and through $P = (4, 5)$
(f) gradient 3, passing through $(2, 3)$.

(2 points)

Exercise 2. *Find the equation of the lines described below*

(a) passing through $(1, 1)$ *and* $(4, -8)$,
(b) passing through $(0, 2)$ *and* $(4, 0)$.

(2 points)

Exercise 3. *Find the* x*- and* y*-intercepts of each linear function.*

(a) $y = 3x + 7$
(b) $y = 5x - 10$
(c) $2x - 9y = 18$
(d) $4x + 8y = 9$.

(2 points)

Exercise 7. *Find the equation of the tangent to each circle at the point specified:*

(a) circle $x^2 + y^2 - 2x - 4y - 20 = 0$, *point* $(4, -2)$;
(b) circle $x^2 + y^2 + 4x + 2y - 20 = 0$, *point* $(1, 3)$;

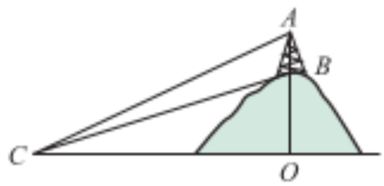
(2 points)

Exercise 11. *The line* $3x + ky - k = 0$ *is tangent to the circle* $x^2 + y^2 - 10x - 2y + 17 = 0$. *Find the two values of* k.

(2 points)

6 AB is a tower 60 m high on top of a hill. The magnitude of ACO is 49° and the magnitude of BCO is 37°.

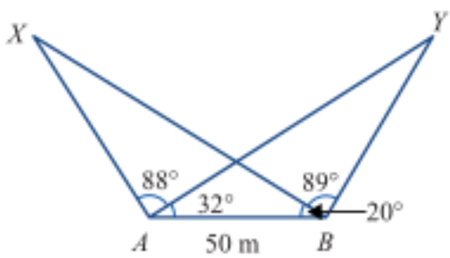
a Find the magnitude of angles ACB, CBO and CBA.
b Find the length of BC.
c Find the height of the hill, i.e. the length of OB.



(2 points)

9 Find:

a AX **b** AY

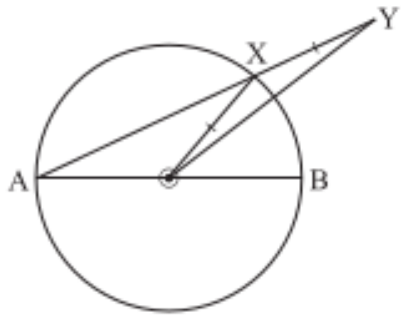


Exercise 4.

(2 points)

[AB] is the diameter of a circle centre O. X is a point on the circle and [AX] is produced to Y such that OX = XY.

Prove that angle YOB is three times the size of angle XOY.

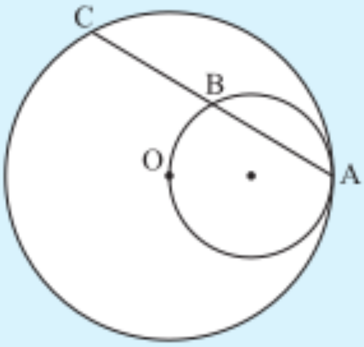


Exercise 5.

(2 points)

Given a circle, centre O, and a point A on the circle, a smaller circle of diameter [OA] is drawn. [AC] is any line drawn from A to the larger circle, cutting the smaller circle at B.

Prove that the smaller circle will always bisect [AC].



Exercise 8.

(2 points)

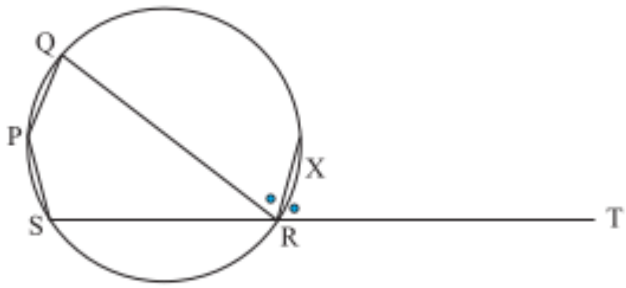
Triangle ABC is inscribed in a circle. P, Q and R are any points on arcs AB, BC and AC respectively. Prove that angles ARC, CQB and BPA have a sum of 360^o.

Exercise 10.

(2 points)

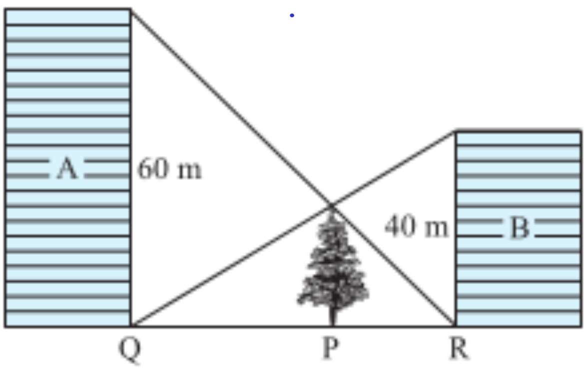
[RX] is the bisector of angle QRT.

Prove that [PX] bisects angle QPS.



Exercise 12.

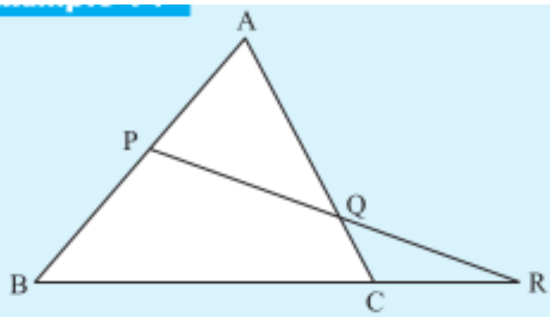
(2 points)



A pine tree grows between two buildings A and B. On one day it was observed that the top of A, the apex of the tree, and the foot of B line up and at the same time, the foot of A, the apex and the top of B line up, as illustrated. Find the height of the tree.

Exercise 13.

(2 points)

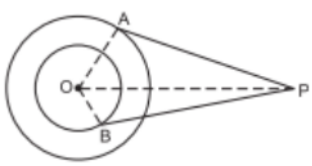


If P divides [AB] in the ratio 2 : 3 and Q divides [AC] in the ratio 5 : 2, in what ratio does R divide [BC]?

Exercise 17.

(2 points)

In the given figure, O is the centre of two concentric circles of radii 4 cm and 6 cm respectively. PA and PB are tangents to the outer and inner circle respectively. If PA = 10 cm, find the length of PB up to one place of decimal.



In Figure 7, the diagonals AC and BD of a quadrilateral $ABCD$ meet at M in such a way that $AM = MC$ and $DM = 2MB$. Suppose that X and Y are points on MC and BC respectively such that

$$\frac{AC}{MX} = \frac{BY}{YC} = 3.$$

Show that the points D, X and Y are collinear.

Exercise 14.

(3 points)

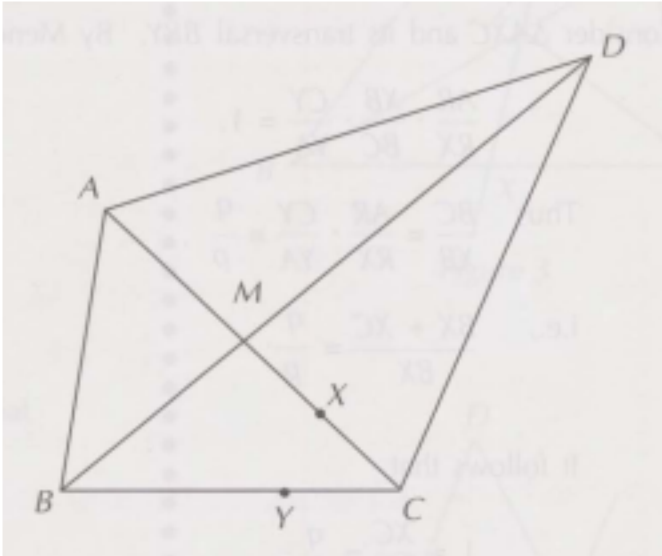
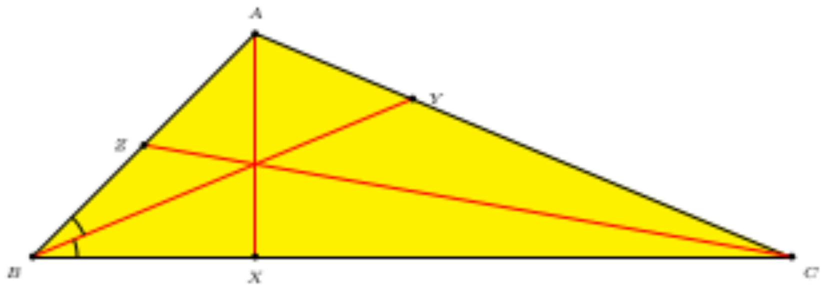


Figure 7

Exercise 15.

(3 points)

(3) In triangle ABC, $A = \frac{5\pi}{8}$, $B = \frac{\pi}{4}$, and $C = \frac{\pi}{8}$. Prove that the A-altitude, the B-bisector, and the C-median are concurrent.



Exercise 16.

(2 points)

In the given figure, O is the centre of a circle. PT and PQ are tangents to the circle from an external point P. If ∠TPQ = 70, find ∠TRQ.