

SIMULTANEOUS EQUATIONS

CANSU OLCE

A STAR MATHS (www.astarmaths.com.au)

1. Solve the following simultaneous equations.

a) $2x - y = 7$

$$y^2 - x(x + y) = 11$$

b) $p + 2q = 1$

$$\frac{2q}{p} - \frac{3p}{q} = 5$$

2. Find the values of x and y which satisfy each of the following pairs of simultaneous equations. Give the answers correct to three decimal places.

a) $x + 2y = -1$

$$x - 3y^2 = -5$$

b) $x + y = 3$

$$\frac{1}{x} - \frac{1}{y} = 2$$

3. Solve the simultaneous equations

$$y + 2x = 1$$

$$x^2 + y(x - 3) - 3 = 0$$

4. Solve the simultaneous equations

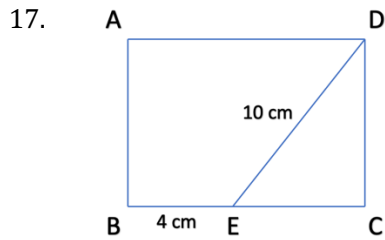
$$2p^2 - 3q^2 = 4$$

$$\frac{p}{2} - q = 1$$

Give the answers correct to four decimal places.

5. Solve the simultaneous equations $3x - y = y^2 + xy + x^2 = 1$.
6. Solve the simultaneous equations $2m - n = \frac{m}{n} - \frac{3}{m} = 1$
Give the answers correct to two decimal places.
7. Find the values of r and s which satisfy the simultaneous equations
 $r(r - s) + 5 = 2r - s - 4 = 0$.
8. Find the values of k and m which satisfy the simultaneous equations
 $k^2 + 6km = k + 2m = -3$.
Give the answers correct to two decimal places.
9. Given that $(-k, h+1)$ is a solution to the simultaneous equations $2x - y = 3$ and
 $y = 3x^2 - 5x - 9$, find the possible values of h and k .
10. Given that $x = \frac{2}{p}$ and $y = \frac{1}{p}$ satisfy the simultaneous equations $3x - 3y = 5$ and $\frac{2}{x} - \frac{1}{y} = -2$,
find the possible values of p and q .

11. Find the coordinates of the points of intersection of the graphs $2y - x = 3$ and $y = x^2 - x - 1$.
12. Find the coordinates of the points of intersection of the straight line $x - y = 5$ and the curve $x^2 + 2xy + y^2 = 9$.
13. The straight line $2y + px = 4$ intersects the curve $3y^2 - 3x^2 + p = 0$ at point $(2, -q)$. Find the possible values for p and q .
14. Given $(m+1, 2)$ is a point of intersection of the graphs $\frac{x}{3} + \frac{y}{2} = n$ and $\frac{3}{x} + \frac{n}{y} = 2$. Find the possible values of m and n .
15. Given that $(-1, 2t)$ is a solution to the simultaneous equations $x^2 + ky + y^2 = kx + 3y = 4$, find the possible values of k and t .
16. Given the sum of the coordinates of point $(p, 2q)$ is 17 and its distance from the origin is 13 units. Find the possible values of p and q .



In the diagram, ABCD is a rectangle with a perimeter of 36 cm. Given that $BE=4$ cm and $DE=10$ cm, find the possible lengths and widths of the rectangle.

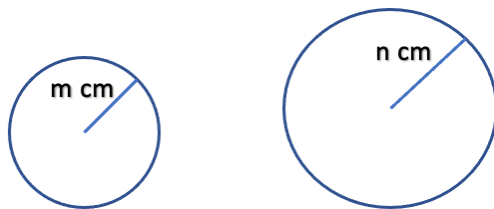
18. Given the total surface area of a cuboid with a square base is 80cm^2 and the sum of all its edges is 44cm. Find the possible values of the volume of the cuboid.
19. A point P lies on the straight line $7y - x = 25$ such that its distance from the origin is 5 units. Find the possible coordinates of point P.
20. A point with coordinates $(s - 1, 2t)$ lies on the curve $y = x^2 + 3$ such that the straight line $x + y = 3$ also passes through it. Find the possible values of s and t.
21. The total area of a right cylindrical block is $54\pi\text{cm}^2$ and its height is longer than its radius by 3 cm. Calculate its radius and height.

22. The perimeter of a right-angled triangle is 48 cm. If its hypotenuse is 20 cm, calculate the lengths of the other two sides of the triangle.
23. Solve the simultaneous equations $2x + y^2 = y - x = 5$.
24. Solve the simultaneous equations $2p + 3q + 1 = 0$ and $p^2 + 6pq + 6 = 0$. Give the answers correct to three decimal places.
25. Given $(-2t, r)$ is a point of intersection of the graphs $2x + 3y = 9$ and $\frac{x}{y} - \frac{6y}{x} = 1$. Find the possible values of t and r .
26. Find the coordinates of the points of intersection of the curve $y^2 = 4(3 - x)$ and the straight line $\frac{y}{x} - 4 = 0$.
27. Given that $(-2m, 3n)$ is a solution to the simultaneous equations $y - 2x = 4$ and $\frac{2}{y} + \frac{3}{2x} = 1$. Find the possible values of m and n .

28. Given that $(2, -3p)$ is a solution to the simultaneous equations $x^2 + my + y^2 = -2mx + 2y = 10$, find the possible values of p and m .

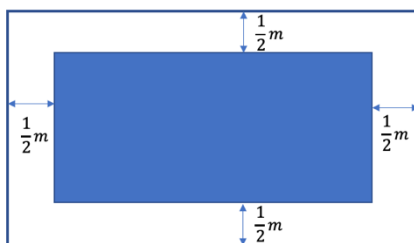
29. The point $(-2, 3k)$ satisfies both the equations of the graphs $x^2 + py - 15 = 4$ and $px - xy = 4$. Find the possible values of p and k .

30.



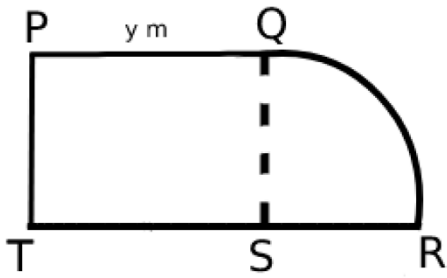
The diagram shows two circles each with radius m and n cm respectively. Given that the sum of their circumferences is 60π cm and their total area is $458\pi\text{cm}^2$, find the values of m and n .

31.



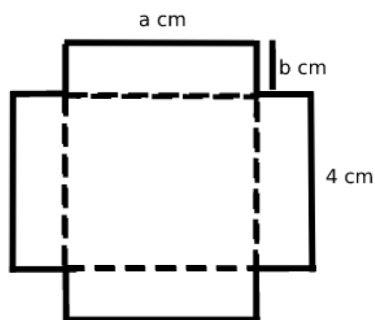
The diagram shows a rectangular floor with the shaded region being covered by a carpet. The carpet is placed in the middle such that its sides are $\frac{1}{2}m$ from the corresponding sides of the floor. Given that the perimeter and area of the carpet are 12 m and 8m^2 respectively, find the length and breadth of the floor.

32.



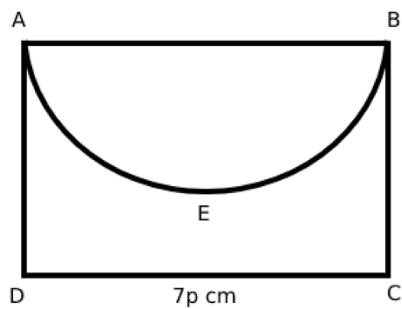
The diagram consisting of a rectangle PQST and a circular quadrant QRS with centre S.
 Given the area of the pool is $30\pi\text{m}^2$ and PQ is longer than arc QR by $\pi/2$ m. Find the values of x and y.

33.



The diagram shows the net of an open cuboid. If the perimeter of the net is 30 cm and the total surface area of the cuboid is 50cm^2 , find the possible values of a and b.

34



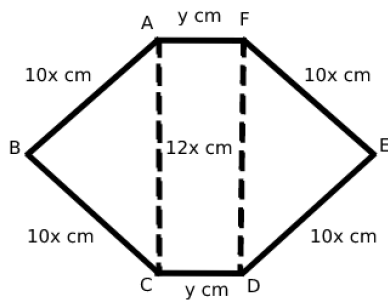
In the diagram, ABCD is rectangular piece of paper with an area of 63cm^2 . AEB is a semicircle which is cut away from the paper. If the perimeter of the remaining paper is 60 cm, find the integer values of p and q. (Use $\pi = 22/7$)

35. Given P, Q and R are three places, where Q is 150 km from P and R is 200 km from Q. A car travels from P to Q with a speed of x km/h, then from Q to R with a speed of y km/h. Given that the value of x is greater than y by 30 and the total time taken by the car to travel from P to R is 5 hours, find the values of x and y .
36. Solve simultaneous equations $2x + y = -3$ and $x^2 + x - 2y = 2$.
37. Solve the simultaneous equations $s + w = -1$ and $2s^2 - 3w = 9$. Give the answers correct to three decimal places.

38. Solve the simultaneous equations $x + \frac{y}{6} = \frac{1}{2}$ and $xy + 6 = 12x$.

39. Solve the simultaneous equations $2x - y = -3$ and $2x^2 - xy - y^2 = 3$. Give the answers correct to three decimal places.

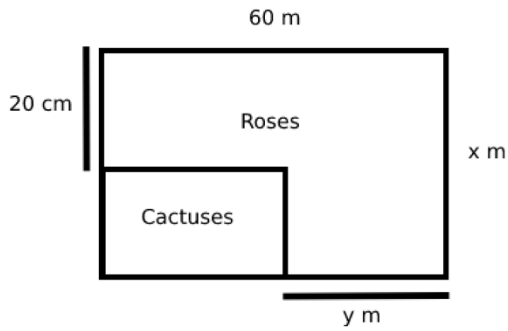
40.



The diagram shows a polygon ABCDEF formed from a 48 cm long wire. ABC and FED are two isosceles triangles while ACDF is a rectangle.

If the area of the polygon is 144 cm^2 , find the value of x and y.

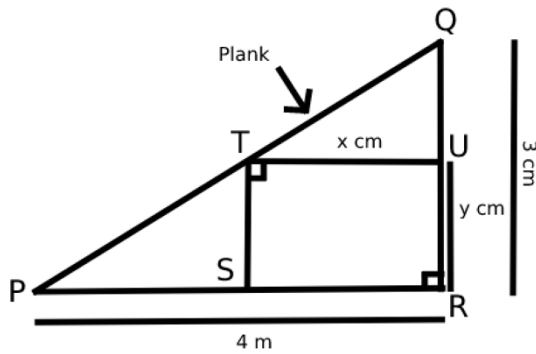
41.



Mr. Chuan has a rectangular piece of land in Cameron Highlands. He plants cactuses and roses in the region as shown in the diagram.

Given that the region planted with roses is 1840 m^2 and the perimeter of the rectangular region planted with cactuses is 96 m , find the value of x and y .

42.



The diagram shows the cross-section of a straight plank, PQ , leaning against a wall, QR . The plank touches a cuboid, $RSTU$. The length and breadth of the cross-section of the cuboid are $x \text{ m}$ and $y \text{ m}$ respectively.

Given that the cross-sectional area of the cuboid is 3 m^2 , find the value of x and y .

ANSWER KEY

1. a) $x=2, y=-3; x=19, y=31$ b) $p=1/7, q=3/7$
2. a) $x=-2.738, y=0.869; x=2.070, y=-1.535$ b) $x=0.419, y=2.581; x=3.581, y=-0.581$
3. $x=1, y=-1; x=6, y=-11$
4. $p=-3.8532, q=-2.9266; p=1.4532, q=-0.2734$
5. $x=0, y=-1; x=7/13, y=8/13$
6. $m=0.54, n=0.08; m=-5.54, n=-12.08$
7. $r=-1, s=-6; r=5, s=6$
8. $k=-4.81, m=0.91; k=0.31, m=-1.66$
9. $h=2, k=-3; h=-16/3, k=2/3$
10. $p=-12/5, q=-2/5; p=1, q=3$
11. $(-1,1), (5/2, 11/4)$
12. $(1,-4), (4,-1)$
13. $p=0, q=-2; p=11/3, q=5/3$
14. $m=2, n=2; m=5, n=3$
15. $k=1/2, t=3/4; k=-11/2, t=-1/4$
16. $p=5, q=6; p=12, q=5/2$
17. length=10cm, width=8 cm; length=12cm, width=6 cm
18. $48cm^3, 48\frac{4}{27}cm^3$
19. $(-4,3), (3,4)$
20. $s=0, t=2; s=1, t=3/2$
21. Radius=3 cm, height= 6 cm
22. 12 cm, 16 cm
23. $x=-10, y=-5; x=-2, y=3$
24. $p=-1.786, q=0.857; p=1.120, q=-1.080$
25. $t=-3/2, r=1; t=-9, r=-9$
26. $(3/4, 3), (-1,-4)$
27. $m=3/4, n=1/3; m=-1, n=8/3$
28. $p=4/9, m=-19/6; p=-1, m=-1$
29. $k=-1, p=-5; k=5/3, p=3$
30. $m=13, n=17$
31. length=5m, breadth=3m
32. $x=6, y=7\pi/2$
33. $a=7, b=1; a=8, b=3/4$
34. $p=3, q=3$
35. $x=90, y=60$
36. $x=-4, y=5; x=-1, y=-1$

37. $s=-2.637, w=1.637; s=1.137, w=-2.137$

38. $x=-2, y=15; x=1/2, y=0$

39. $x=-1.157, y=0.686; x=-2.593, y=-2.186$

40. $x=1, y=4$

41. $x=40, y=32$

42. $x=2, y=1.5$

www.astarmaths.com.au