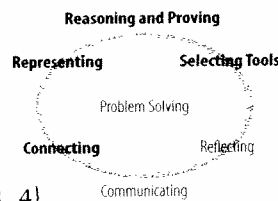


8. Determine the value(s) of k for which the quadratic equation $x^2 + kx + 9 = 0$ will have

- a) two equal real roots
b) two distinct real roots

9. a) Create a table of values for the function $f(x) = 2x^2 - 3x$ for the domain $\{-2, -1, 0, 1, 2, 3, 4\}$.



- b) Graph this quadratic function.
c) On the same set of axes, graph the line $y = 6$.
d) Use your graph to determine the approximate x -values where the line $y = 6$ intersects the quadratic function.
e) Determine the x -values for the points of intersection of $f(x) = 2x^2 - 3x$ and the horizontal line $y = 6$ algebraically.

10. **Use Technology** Check your answer to question 9 using a graphing calculator.

11. What value(s) of k , where k is an integer, will allow each quadratic equation to be solved by factoring?

- a) $x^2 + kx + 12 = 0$
b) $x^2 + kx = 8$ c) $x^2 - 3x = k$

12. The height, h , in metres, above the ground of a football t seconds after it is thrown can be modelled by the function $h(t) = -4.9t^2 + 19.6t + 2$. Determine how long the football will be in the air, to the nearest tenth of a second.

13. A car travelling at v kilometres per hour will need a stopping distance, d , in metres, without skidding that can be modelled by the function $d = 0.0067v^2 + 0.15v$. Determine the speed at which a car can be travelling to be able to stop in each distance. Round answers to the nearest tenth.

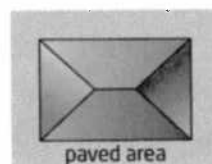
- a) 37 m b) 75 m c) 100 m

14. A by-law restricts the height of structures in an area close to an airport. To conform with this by-law, fuel storage tanks with different capacities are built by varying the radius of the cylindrical tanks. The surface area, A , in square metres, of a tank with radius r , in metres, can be approximately modelled by the quadratic function $A(r) = 6.28r^2 + 47.7r$. What is the radius of a tank with each surface area?

- a) 1105 m^2
b) 896.75 m^2

15. The length of a rectangle is 2 m more than the width. If the area of the rectangle is 20 m^2 , what are the dimensions of the rectangle, to the nearest tenth of a metre?

16. A building measuring 90 m by 60 m is to be built. A paved area of uniform width will surround the building. The paved area is to have an area of 9000 m^2 . How wide is the paved area?



17. If the same length is cut off three pieces of wood measuring 21 cm, 42 cm, and 45 cm, the three pieces of wood can be assembled into a right triangle. What length needs to be cut off each piece?

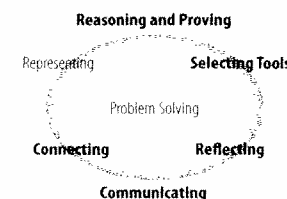
18. In Vancouver, the height, h , in kilometres, that you would need to climb to see to the east coast of Canada can be modelled by the equation $h^2 + 12\,740h = 20\,000\,000$. If the positive root of this equation is the solution, find the height, to the nearest kilometre.

19. **Chapter Problem** Andrea has been asked to determine when (if ever) the volume, V , in hundreds of shares, of a company's stock, which can be modelled by the function $V(x) = 250x - 5x^2$, after being listed on the stock exchange for x weeks, will reach

- a) 275 000 shares in a week
b) 400 000 shares in a week
What answer should Andrea give?

20. Small changes to a quadratic equation can have large effects on the solutions. Illustrate this statement by solving each quadratic equation.

- a) $x^2 + 50x + 624 = 0$
b) $x^2 + 50x + 625 = 0$
c) $x^2 + 50x + 626 = 0$



Achievement Check

21. A diver followed a path defined by $h(t) = -4.9t^2 + 3t + 10$ in her dive, where t is the time, in seconds, and h represents her height above the water, in metres.

- a) At what height did the diver start her dive?
b) For how long was the diver in the air?
c) The -4.9 in front of the t^2 term is constant because it relates to the acceleration due to gravity on Earth. If the diver always starts her dives from the same height, what other value in the quadratic expression will never change?
d) What is the only value in the quadratic expression that can change? Suggest a way in which this value can change.
e) If the value in part d) changed to 6, how much longer would the diver be in the air?

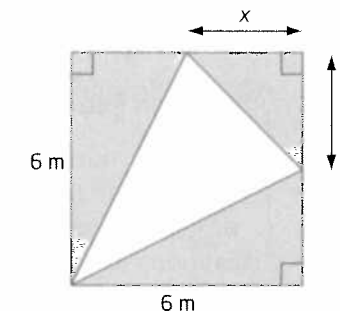
Extend

22. Complete the square on the expression $ax^2 + bx + c = 0$ to show how the quadratic formula is obtained.

23. A cubic block of concrete shrinks as it dries. The volume of the dried block is 30.3 cm^3 less than the original volume while the length of each edge has decreased by 0.1 cm. Determine the length and volume of the concrete block before it dried.

24. In the diagram, the square has a side length of 6 m. The square is divided into three right triangles and one isosceles triangle. The areas of the three right triangles are equal.

- a) Find the value of x .
b) Find the area of the acute isosceles triangle.



25. **Math Contest** If $f(x) = 2x^2 - 13x + f(c) = -16$, then one possible value for c is
A -2 B 2 C -4 D 8

26. **Math Contest** The function $f(x) = 3x^2 + 9x - 3$ has x -intercepts p and q . The value of $p - pq + q$ is
A -2 B $3 + 5\sqrt{13}$
C 0 D -4

27. **Math Contest** The squares MNOP and IJKL overlap as shown. K is the center of MNOP. What is the area of quadrilateral KROQ in terms of the area of MNOP?

