The first number always represents the number of rows and the second number always represents the number of columns.

4. Look at the matrix C on page 628. What number does C_{41} have for an address? What address does 6.00 have?

To find the number whose address is C_{41}, find the number is in the 4th row and 1st column. This number is 1.12.

To find the address of 6.00, look at which row and column it is in. The number, 6.00, is in the 2nd row and 2nd column. Therefore, its address is C_{22}.

5. Look at pages 630 and 631. What different operations can you do with matrices?

On pages 630 and 631, the lesson describes how to add matrices, subtract matrices, multiply a matrix by a constant, and multiply two matrices.

6. What might be some advantages to using a matrix?

One advantage is that you only deal with the numbers of the problem and not the excess information.

Another advantage is that several numbers can be included in a matrix. This makes it easier to manipulate many numbers at one time.

7. Why is it useful to learn new concepts?

This activity is used to show that there is always another way to solve a problem. Learning alternate ways to solve a problem is helpful in strengthening your mathematical ability.

The following are complete worked out solutions to selected exercises in the student textbook. These solutions are provided to you so that you can help your child with their homework. Your child's classroom notes, example problems in the text, and these worked out solutions are all useful tools to help you and your child work through their assignment.

40. $\sqrt{2x+6} = x-1$

$(\sqrt{2x+6})^2 = (x-1)^2$

$2x+6 = x^2-2x+1$

$0 = x^2-4x-5$

$0 = (x-5)(x+1)$

$x = 5$ or $x = -1$

Check: $x = 5$

$\sqrt{2x+6} = x-1$

$\sqrt{2(5)+6} = 5-1$

$\sqrt{16} = 4$

$4 = 4$

$x = -1$

$\sqrt{2x+6} = x-1$

$\sqrt{2(-1)+6} = -1-1$

$\sqrt{4} = -2$

$2 \neq -2$

Solution: $x = 5$

46. $3x^2 - 27 = 0$

$3x^2 = 27$

$x^2 = 9$

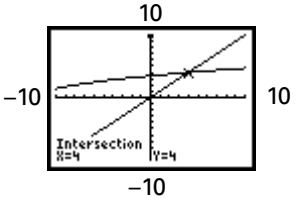
$x = \pm 3$

51. $\sqrt{x} = 9$

$(\sqrt{x})^2 = 9^2$

$x = 81$

54.



The intersection point is (4, 4) so the solution to the equation is $x = 4$.

60. If t is multiplied by c, l is multiplied by c^2.

$\left(ct = \frac{\sqrt{c^2\, 4\pi^2 l}}{32}\right)$

61. a. $E = \frac{1}{2}mv^2$

$2E = mv^2$

$\frac{2E}{m} = v^2$

$\sqrt{\frac{2E}{m}} = v$

$\frac{\sqrt{2E}}{\sqrt{m}} \cdot \frac{\sqrt{m}}{\sqrt{m}} = v$

$\frac{\sqrt{2Em}}{m} = v$

b. $v = \sqrt{\frac{2E}{m}}$

$= \sqrt{\frac{2(50)}{0.14}}$

$= \sqrt{\frac{100}{0.14}}$

≈ 26.73

The velocity is about 26.73 meters per second.

Lesson 12.3

12. hypotenuse $= y = \overline{XZ}$
leg $= x = \overline{YZ}$
leg $= z = \overline{XY}$

26. $4^2 + (4\sqrt{3})^2 \stackrel{?}{=} 8^2$
$16 + 48 \stackrel{?}{=} 64$
$64 = 64$

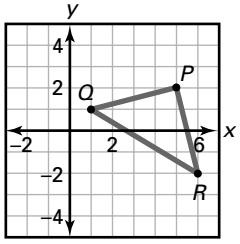
Yes, 4, $4\sqrt{3}$, 8 can be the side lengths of a right triangle.

29. $x^2 + (10)^2 = (14)^2$
$x^2 = 196 - 100$
$x = \sqrt{96}$
$x \approx 9.8$ feet

Lesson 12.4

26. $J(5, -3), K(5, 6)$
$JK = \sqrt{(5 - 5)^2 + (6 - (-3))^2}$
$= \sqrt{0^2 + 9^2}$
$= \sqrt{0 + 81}$
$= \sqrt{81}$
$= 9$

39. $P(5, 2), Q(1, 1), R(6, -2)$



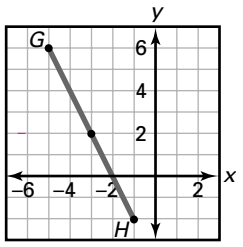
$PQ = \sqrt{(1 - 5)^2 + (1 - 2)^2}$
$= \sqrt{(-4)^2 + (-1)^2}$
$= \sqrt{16 + 1}$
$= \sqrt{17}$
$QR = \sqrt{(6 - 1)^2 + (-2 - 1)^2}$
$= \sqrt{5^2 + (-3)^2}$
$= \sqrt{25 + 9}$
$= \sqrt{34}$
$PR = \sqrt{(6 - 5)^2 + (-2 - 2)^2}$
$= \sqrt{1^2 + (-4)^2}$
$= \sqrt{1 + 16}$
$= \sqrt{17}$

$PQ = PR$, so $\triangle PQR$ is isosceles; it cannot be scalene. $\overline{QR}$ has a different length than $\overline{PQ}$ and $\overline{PR}$ so $\triangle PQR$ is not equilateral.

$(\sqrt{17})^2 + (\sqrt{17})^2 = (\sqrt{34})^2$
$17 + 17 = 34$
$34 = 34$

$\triangle PQR$ is a right triangle.

44.



$G(-5, 6), H(-1, -2)$

$$\text{midpoint } \overline{GH} = \left(\frac{-5 + (-1)}{2}, \frac{6 + (-2)}{2}\right)$$
$$= (-3, 2)$$

52. $P(x_1, y_1), Q(6, -2), M(9, 4)$

$$\bar{x} = \frac{x_1 + x_2}{2} \qquad \bar{y} = \frac{y_1 + y_2}{2}$$
$$9 = \frac{x_1 + 6}{2} \qquad 4 = \frac{y_1 + (-2)}{2}$$
$$18 = x_1 + 6 \qquad 8 = y_1 - 2$$
$$12 = x_1 \qquad 10 = y_1$$
$$P(x_1, y_1) = (12, 10)$$

Lesson 12.5

14. $(x - 4)^2 + (y - (-2))^2 = 3^2$
$(x - 4)^2 + (y + 2)^2 = 9$

18. $(x - 5)^2 + (y + 3)^2 = 625$
center: $(5, -3)$
radius: 25

26. center: $(0, 0)$

$$\text{radius: } \sqrt{3^2 + 4^2} = \sqrt{9 + 16}$$
$$= \sqrt{25}$$
$$= 5$$
$$x^2 + y^2 = 25$$

34.

$$\text{slope of } \overline{MN} = \frac{2 - 4}{7 - 3}$$
$$= \frac{-2}{4}$$
$$= -\frac{1}{2}$$

$$\text{slope of } \overline{QR} = \frac{3 - 7}{12 - 4}$$
$$= \frac{-4}{8}$$
$$= -\frac{1}{2}$$

The slopes are the same.

Lesson 12.6

20. $\tan B = \frac{b}{a}$

$\tan 60° = \frac{b}{10}$

$10(\tan 60°) = b$

$17.32 \approx b$

b is about 17.32 ft.

26. Let $x =$ the angle of depression, and $d =$ distance from the tower.

$\tan x = \frac{200}{d}$

$d = \frac{200}{\tan x}$

Animal	Angle of depression	Distance
bear	3°	$\frac{200}{\tan 3°} \approx 3816$ feet
raccoon	15°	$\frac{200}{\tan 15°} \approx 746$ feet
fox	20°	$\frac{200}{\tan 20°} \approx 549$ feet
moose	2°	$\frac{200}{\tan 2°} \approx 5727$ feet

29. Slope of $\frac{7}{100}$ gives a rise of 7, run of 100.

The angle of inclination is opposite to the rise and adjacent to the run, so if x is the angle's measure:

$\tan x = \frac{7}{100}$

$x = \tan^{-1}\left(\frac{7}{100}\right)$

$\approx 4.0°$

The angle that the road inclines is about 4°.

Lesson 12.7

41. $\sin x = \frac{32.0}{48.0}$

$x = \sin^{-1}\left(\frac{32.0}{48.0}\right)$

$x \approx 41.8°$

44. $\cos x = \frac{13.9}{18.7}$

$x = \cos^{-1}\left(\frac{13.9}{18.7}\right)$

$x \approx 42.0°$

48. $\sin B = \frac{b}{c}$

$\sin 35° = \frac{b}{65}$

$b = 65(\sin 35°)$

$b \approx 37.3$

50. $\cos B = \frac{a}{c}$

$\cos B = \frac{25}{154}$

$B = \cos^{-1}\left(\frac{25}{154}\right)$

$B \approx 80.7°$

60. Let $x =$ length of the wire

$\sin 25° = \frac{30}{x}$

$x = \frac{30}{\sin 25°}$

$x \approx 70.99$

The wire is about 70.99 feet long.

Lesson 12.8

22. $\begin{bmatrix} 4 & 2 \\ 6 & -7 \\ 3 & 9 \end{bmatrix} + \begin{bmatrix} -5 & 7 \\ -3 & 9 \\ 3 & -6 \end{bmatrix} - \begin{bmatrix} -11 & 3 \\ 8 & -15 \\ -7 & -2 \end{bmatrix} = \begin{bmatrix} 4 + (-5) - (-11) & 2 + 7 - 3 \\ 6 + (-3) - 8 & -7 + 9 - (-15) \\ 3 + 3 - (-7) & 9 + (-6) - (-2) \end{bmatrix}$

$= \begin{bmatrix} 10 & 6 \\ -5 & 17 \\ 13 & 5 \end{bmatrix}$

27. $-3\begin{bmatrix} 5 & 17 & -3 \\ 12 & -8 & 2 \\ -7 & 14 & 12 \end{bmatrix} = \begin{bmatrix} -3(5) & -3(17) & -3(-3) \\ -3(12) & -3(-8) & -3(2) \\ -3(-7) & -3(14) & -3(12) \end{bmatrix} = \begin{bmatrix} -15 & -51 & 9 \\ -36 & 24 & -6 \\ 21 & -42 & -36 \end{bmatrix}$

29. $\begin{bmatrix} 4 & -6 \\ 12 & 8 \end{bmatrix}\begin{bmatrix} 3 & -8 \\ 4 & 9 \end{bmatrix} = \begin{bmatrix} 4(3) + (-6)(4) & 4(-8) + (-6)(9) \\ 12(3) + 8(4) & 12(-8) + 8(9) \end{bmatrix} = \begin{bmatrix} -12 & -86 \\ 68 & -24 \end{bmatrix}$