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Unit 10 - Radical Expressions and Equations Review Guide

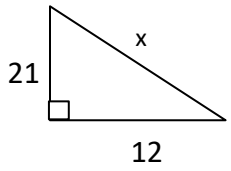
Use the Pythagorean Theorem to find the length of the missing third side.

1. $a = 6 \quad b = 9 \quad c = ?$

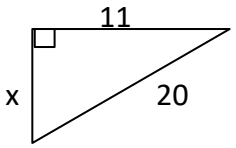
2. $c = 12 \quad b = 6 \quad a = ?$

In the following triangles, find the length of the unknown sides.

3.



4.



Determine whether each set of numbers form a Pythagorean triple.

5. $(6, 8, 10)$

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Unit 10 - Radical Expressions and Equations Review Guide

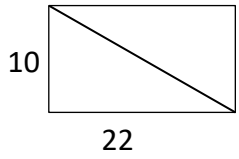
Determine whether the following side measures form right triangle.

6. $(10, 11, 20)$

Find the distance between the point at $(2, -4)$ and $(-1, 6)$.

7. (x_1, y_1) (x_2, y_2) $d = ?$
$(2, -4)$ $(-1, 6)$

8. A rectangle has a width of 10 and a length of 22. How long is the diagonal of the rectangle?



Write each expression in radical form.

9. $z^{\frac{2}{5}} =$

10. $(2x - 3)^{\frac{5}{4}} =$

Write each expression in exponential form.

11. $\sqrt[4]{x^3} =$

12. $\sqrt{(5 + 2y)} =$

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Unit 10 - Radical Expressions and Equations Review Guide

Simplify the following expressions. Assume that all variables represent positive real numbers.

13. $\sqrt[4]{625} =$

14. $\sqrt{49x^6y^2} =$

15. $\sqrt{80} =$

16. $\sqrt[4]{\frac{112x^5}{y^4}} =$

17. $\frac{1}{\sqrt{7}} =$

18. $\frac{1}{\sqrt[3]{2}} =$

Simplify radicals and recognize like or unlike radicals.

19. $5\sqrt{7}; \quad 7\sqrt{5}\,;$

20. $3\sqrt{6}; \quad \sqrt{24}$

Simplify the following expressions.

21. $\left(\sqrt[5]{-243}\right)^2 =$

22. $\sqrt[3]{\sqrt{a^2y^3}} =$

Add, subtract and simplify the following expressions. Assume that all variables represent positive real numbers.

23. $\sqrt{5} + \sqrt{125} - 5\sqrt{20} =$

24. $\sqrt{200} - \sqrt{18} - \sqrt{50} =$

Multiply and simplify the following expressions. Assume that all variables represent positive real numbers.

25. $\sqrt{2}(\sqrt{5} - \sqrt{2}) =$

26 $\sqrt{ab}\left(\sqrt{ab^2} - \sqrt{ab}\right) =$

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Unit 10 - Radical Expressions and Equations Review Guide

27. $(\sqrt{3}+\sqrt{2})(\sqrt{2}-\sqrt{5})=$

28. $(x+\sqrt{x})(\sqrt{x}-1)=$

Simplify the following expressions. Assume that all variables represent positive real numbers.

29. $\sqrt{2}*\sqrt[3]{3}=$

30. $\dfrac{2}{2-\sqrt{2}}=$

31. $\dfrac{1+\sqrt{x}}{1-\sqrt{x}}=$

Solve the following radical equation.

32. $\sqrt{y+3}=11$

Checking solution:

33. $\sqrt{10-x}=\sqrt{x-1}$

Checking solution:

Unit 10 - Radical Expressions and Equations Review Guide

34. $\sqrt{2x-2}+6=2$ Checking solution:

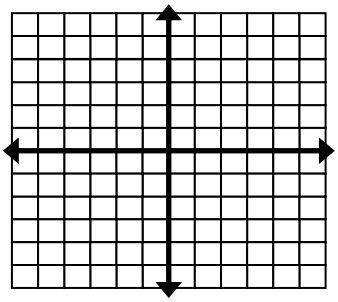
Identify the domain and range of each function.

35. $y=\sqrt{x-11}$ **Domain** **Range**

36. $y=\sqrt{x}+8$ **Domain** **Range**

Graph square root function

37. $y=\sqrt{x-3}$



Use the description to write the square root function $g(x)$.

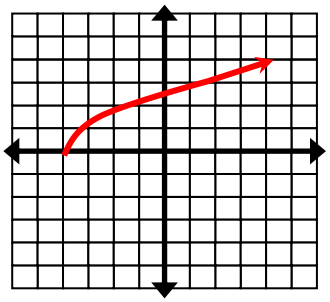
38. The parent function $f(x)=\sqrt{x}$ is reflected across the x-axis, and translated up 4 units.

Name: _____ Period: _____ Date: _____

Unit 10 - Radical Expressions and Equations Review Guide

Use the graph shown as a guide, write the equation and describe the transformation.

39.



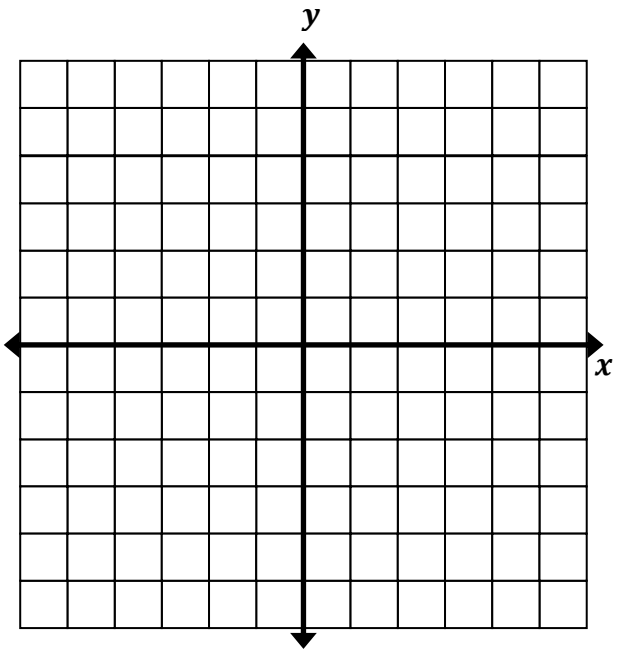
Graph function and identify its domain and range.

40. $y = \sqrt{x+1}$

1.
2. Table

x	y

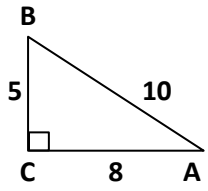
3. Graph



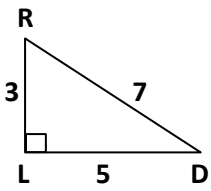
4. Domain Range

Find the value of each ratio.

41. $sin\angle B = ?$



42. $cos\angle D = ?$



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Unit 10 - Radical Expressions and Equations Review Guide

Use your calculator to calculate the following (correct to 2 decimal places).

43. $\boldsymbol{sin\ 37° =}$

44. $\boldsymbol{cos\ 12° =}$

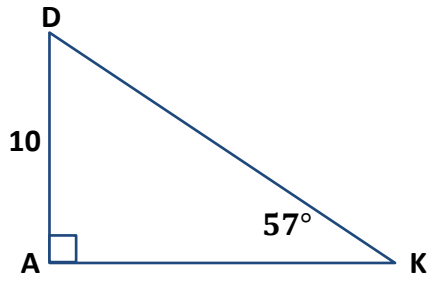
Use your calculator to calculate the following.

45. $\boldsymbol{sin\ \angle B = 0.6428}$ $\boldsymbol{\angle B =}$

46. $\boldsymbol{cos\ \angle K = 0.4226}$ $\boldsymbol{\angle K =}$

Use trigonometric ratios and Pythagorean Theorem to find the values of missing sides and angles.

47.



$\boldsymbol{\overline{DA} = 10}$ $\boldsymbol{\angle K = 57°}$

$\boldsymbol{\overline{AK}} =?$ $\boldsymbol{\angle D} = ?$

$\boldsymbol{\overline{DK}} =?$

Find the value of α that makes each statement true.

48. $\boldsymbol{sin\alpha = cos(3\alpha + 54°)}$

49. $\boldsymbol{cos\alpha = sin(\alpha - 60°)}$

Unit 10 - Radical Expressions and Equations Review Guide

50. Andy walked 10 miles at an angle of $11°$ north of due east. To the nearest tenth of a mile, how far east, *x*, is Andy from his starting point?

51. A damaged tree is supported by a guy wire 15 meters long. The wire makes an angle of $60°$ with the ground. Calculate the height at which the guy wire is attached to the tree.

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Unit 10 - Radical Expressions and Equations Review Guide

ANSWERS

Use the Pythagorean Theorem to find the length of the missing third side.

1. $a = 6 \quad b = 9 \quad c = ?$

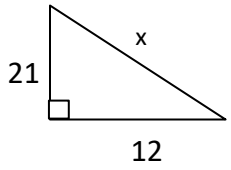
$$c^2 = a^2 + b^2$$
$$c^2 = 6^2 + 9^2$$
$$c^2 = 36 + 81$$
$$c^2 = 117$$
$$c = \sqrt{117}$$
$$c = 10.81$$

2. $c = 12 \quad b = 6 \quad a = ?$

$$c^2 = a^2 + b^2$$
$$a^2 = c^2 - b^2$$
$$a^2 = 12^2 - 6^2$$
$$a^2 = 144 - 36$$
$$a^2 = 108$$
$$a = \sqrt{108}$$
$$a = 10.39$$

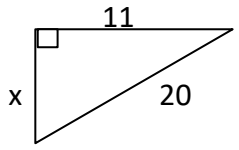
In the following triangles, find the length of the unknown sides.

3.



$$x^2 = 21^2 + 12^2$$
$$x^2 = 441 + 144$$
$$x^2 = 585$$
$$x = \sqrt{585}$$
$$x = 24.18$$

4.



$$x^2 = 20^2 - 11^2$$
$$x^2 = 400 - 121$$
$$x^2 = 279$$
$$x = \sqrt{279}$$
$$x = 16.70$$

Determine whether each set of numbers form a Pythagorean triple.

5. $(6, 8, 10)$

$$10^2 = 6^2 + 8^2$$
$$100 = 36 + 64$$
$$100 = 100$$

yes

Name: _____ Period: _____ Date: _____

Unit 10 - Radical Expressions and Equations Review Guide

Determine whether the following side measures form right triangle.

6. $(10, 11, 20)$

$$20^2 = 10^2 + 11$$
$$400 = 100 + 121$$
$$400 \neq 221$$

no

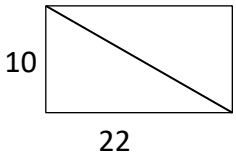
Find the distance between the point at $(2, -4)$ and $(-1, 6)$.

7. (x_1, y_1) (x_2, y_2) $d = ?$

$(2, -4)$ $(-1, 6)$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad d = \sqrt{((-1) - 2)^2 + (6 - (-4))^2}$$
$$d = \sqrt{(-3)^2 + (10)^2}$$
$$d = \sqrt{109}$$

8. A rectangle has a width of 10 and a length of 22. How long is the diagonal of the rectangle?



$$x^2 = 22^2 + 10^2$$
$$x^2 = 484 + 100$$
$$x^2 = 584$$
$$x = \sqrt{584}$$
$$x = 24.16$$

Write each expression in radical form.

9. $z^{\frac{2}{5}} = \sqrt[5]{z^2}$

10. $(2x - 3)^{\frac{5}{4}} = \sqrt[4]{(2x - 3)^5}$

Write each expression in exponential form.

11. $\sqrt[4]{x^3} = x^{\frac{3}{4}}$

12. $\sqrt{(5 + 2y)} = (5 + 2y)^{\frac{1}{2}}$

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Unit 10 - Radical Expressions and Equations Review Guide

Simplify the following expressions. Assume that all variables represent positive real numbers.

13. $\sqrt[4]{625} = \sqrt[4]{5^4} = \pm 5$

14. $\sqrt{49x^6y^2} = \sqrt{7^2 * (x^3)^2 * y^2} = 7x^3y$

15. $\sqrt{80} = \sqrt{5 * 4^2} = 4\sqrt{5}$

16. $\sqrt[4]{\frac{112x^5}{y^4}} = \frac{\sqrt[4]{2^4 * 7 * x * x^4}}{\sqrt[4]{y^4}} = \frac{2x\sqrt[4]{7x}}{y}$

17. $\frac{1}{\sqrt{7}} = \frac{1}{\sqrt{7}} * \frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{7}}{7}$

18. $\frac{1}{\sqrt[3]{2}} = \frac{1}{\sqrt[3]{2}} * \frac{\sqrt[3]{2^2}}{\sqrt[3]{2^2}} = \frac{\sqrt[3]{4}}{2}$

Simplify radicals and recognize like or unlike radicals.

19. $5\sqrt{7}$; $7\sqrt{5}$;

UNLIKE RADICALS

20. $3\sqrt{6}$; $\sqrt{24}$

$3\sqrt{6}$; $\sqrt{2^2 * 6}$

$3\sqrt{6}$; $2\sqrt{6}$

LIKE RADICALS

Simplify the following expressions.

21. $\left(\sqrt[5]{-243}\right)^2 = \sqrt[5]{(-3)^{5*2}} = \sqrt[5]{(-3)^{10}} =$

$= (-3)^2 = 9$

22. $\sqrt[3]{\sqrt{a^2y^3}} = \sqrt[3*2]{a^2y^3} = \sqrt[6]{a^2y^3}$

Add, subtract and simplify the following expressions. Assume that all variables represent positive real numbers.

23. $\sqrt{5} + \sqrt{125} - 5\sqrt{20} =$

$= \sqrt{5} + \sqrt{5 * 5^2} - 5\sqrt{5 * 2^2} =$

$= \sqrt{5} + 5\sqrt{5} - 10\sqrt{5} =$

$= -4\sqrt{5}$

24. $\sqrt{200} - \sqrt{18} - \sqrt{50} =$

$= \sqrt{2 * 10^2} - \sqrt{2 * 3^2} - \sqrt{2 * 5^2} =$

$= 10\sqrt{2} - 3\sqrt{2} - 5\sqrt{2} =$

$= 2\sqrt{2}$

Multiply and simplify the following expressions. Assume that all variables represent positive real numbers.

25. $\sqrt{2}\left(\sqrt{5} - \sqrt{2}\right) =$

$= \sqrt{2} * \sqrt{5} - \sqrt{2} * \sqrt{2} =$

$= \sqrt{10} - 2$

26 $\sqrt{ab}\left(\sqrt{ab^2} - \sqrt{ab}\right) =$

$= \sqrt{a^2b^3} - \sqrt{a^2b^2} =$

$= ab\sqrt{b} - ab$

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Unit 10 - Radical Expressions and Equations Review Guide

27. $(\sqrt{3}+\sqrt{2})(\sqrt{2}-\sqrt{5}) =$
$= \sqrt{3}*\sqrt{2}-\sqrt{3}*\sqrt{5}+\sqrt{2}*\sqrt{2}-\sqrt{2}*\sqrt{5} =$
$= \sqrt{6}-\sqrt{15}+2-\sqrt{10} =$

28. $(x+\sqrt{x})(\sqrt{x}-1) =$
$= x*\sqrt{x}-x*1+\sqrt{x}*\sqrt{x}-\sqrt{x} =$
$= x\sqrt{x}-x+x-\sqrt{x} =$
$= x\sqrt{x}-\sqrt{x}$
$= (x-1)\sqrt{x}$

Simplify the following expressions. Assume that all variables represent positive real numbers.

29. $\sqrt{2}*\sqrt[3]{3} = 2^{\frac{1}{2}}*3^{\frac{1}{3}} = 2^{\frac{1*3}{2*3}}*3^{\frac{1*2}{3*2}} = 2^{\frac{3}{6}}*3^{\frac{2}{6}} = \sqrt[6]{2^3}*\sqrt[6]{3^2} = \sqrt[6]{2^3*3^2} = \sqrt[6]{72}$

30. $\frac{2}{2-\sqrt{2}} =$
$= \frac{2}{2-\sqrt{2}}*\frac{2+\sqrt{2}}{2+\sqrt{2}} =$
$= \frac{2(2+\sqrt{2})}{2^2-(\sqrt{2})^2} =$
$= \frac{2(2+\sqrt{2})}{4-2} =$
$= 2+\sqrt{2}$

31. $\frac{1+\sqrt{x}}{1-\sqrt{x}} =$
$= \frac{1+\sqrt{x}}{1-\sqrt{x}}*\frac{1+\sqrt{x}}{1+\sqrt{x}} =$
$= \frac{(1+\sqrt{x})(1+\sqrt{x})}{1^2-(\sqrt{x})^2} =$
$= \frac{(1+\sqrt{x})^2}{1-x}$

Solve the following radical equation.

32. $\sqrt{y+3} = 11$
$(\sqrt{y+3})^2 = 11^2$
$y+3 = 121$
$y = 121-3$
$y = 118$

Checking solution:
$y = 118$
$\sqrt{118+3} = 11$
$\sqrt{121} = 11$
$11 = 11$
$y = 118$ is a solution of this equation
$\{118\}$

33. $\sqrt{10-x} = \sqrt{x-1}$
$(\sqrt{10-x})^2 = (\sqrt{x-1})^2$
$10-x = x-1$
$2x = 11$
$x = 5.5$

Checking solution:
$x = 5.5$
$\sqrt{10-5.5} = \sqrt{5.5-1}$
$\sqrt{4.5} = \sqrt{4.5}$

$x = 5.5$ is a solution of this equation
$\{5.5\}$

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Unit 10 - Radical Expressions and Equations Review Guide

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

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

$\sqrt{2x-2}=-4$

$\left(\sqrt{2x-2}\right)^2=(-4)^2$

$2x-2=16$

$2x=14$

$x=7$

Checking solution:

$x=7$

$\sqrt{2*7-2}+6=2$

$\sqrt{12}+6=2$

$\sqrt{12}^2=(-4)^2$

$12\neq 16$

$x=7$ is an extraneous solution of this equation

$\emptyset$

Identify the domain and range of each function.

35. $y=\sqrt{x-11}$

Domain

$x-11\geq 0$

$x\geq 11$

$D:[11,\infty]$

Range

$y\geq 0$

$R:[0,\infty]$

36. $y=\sqrt{x}+8$

Domain

$x\geq 0$

$D:[0,\infty]$

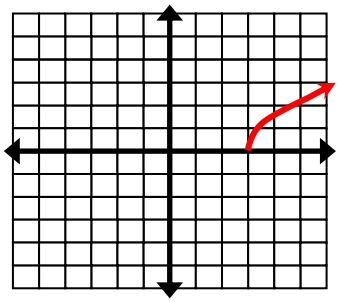
Range

$y\geq 8$

$R:[8,\infty]$

Graph square root function

37. $y=\sqrt{x-3}$



Use the description to write the square root function $g(x)$.

38. The parent function $f(x)=\sqrt{x}$ is reflected across the x-axis, and translated up 4 units.

$g(x)=-\sqrt{x}+4$

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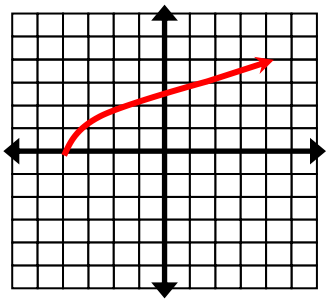
Unit 10 - Radical Expressions and Equations Review Guide

Use the graph shown as a guide, write the equation and describe the transformation.

39.



$g(x) = \sqrt{x+4}$

The parent function $f(x) = \sqrt{x}$ is translated left 4 units.

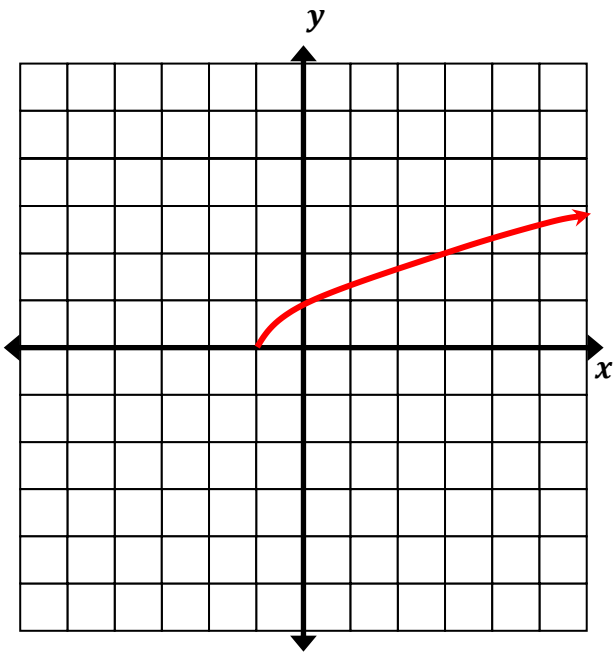
Graph function and identify its domain and range.

40. $y = \sqrt{x+1}$

5. Horizontal Shift: Left 1, No Vertical Shift
6. Table

x	y
-1	0
0	1
3	2
4	2,23
6	2,68

7. Graph

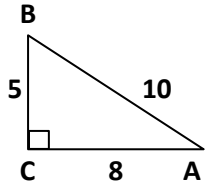


8. Domain
   $x + 1 \geq 0$
   $x \geq -1$
   $D: [-1, \infty]$

   Range
   $y \geq 0$
   $R: [0, \infty]$

Find the value of each ratio.

41. $sin\ \angle B = ?$

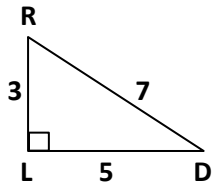


$$sin\ \angle B = \frac{\overline{CA}}{\overline{AB}}$$

$$sin\ \angle B = \frac{8}{10}$$

$$sin\ \angle B = 0.8$$

42. $cos\ \angle D = ?$



$$cos\ \angle D = \frac{\overline{LD}}{\overline{RD}}$$

$$cos\ \angle D = \frac{5}{7}$$

$$cos\ \angle D = 0.71$$

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Unit 10 - Radical Expressions and Equations Review Guide

Use your calculator to calculate the following (correct to 2 decimal places).

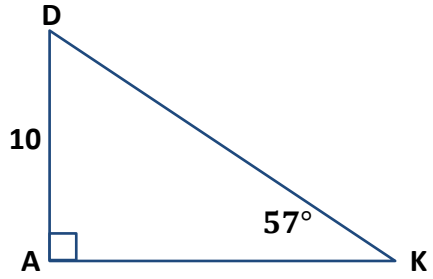
43. $sin\ 37° =$ $sin\ 37° = \mathbf{0.60}$ **44.** $cos\ 12° =$ $cos\ 12° = \mathbf{0.97}$

Use your calculator to calculate the following.

45. $sin\ \angle B = 0,6428$ $\angle B = \mathbf{40°}$ **46.** $cos\ \angle K = 0,4226$ $\angle K = \mathbf{65°}$

Use trigonometric ratios and Pythagorean Theorem to find the values of missing sides and angles.

47.



$\overline{DA} = 10$ $\angle K = 57°$
$\overline{AK} = ?$ $\angle D = ?$
$\overline{DK} = ?$

$tan\angle K = \frac{\overline{DA}}{\overline{AK}}$

$tan\ 57° = \frac{10}{\overline{AK}}$

$\overline{AK} = \frac{10}{tan57°}$

$\overline{AK} = \frac{10}{1.53}$

$\mathbf{\overline{AK} = 6.53}$

$\overline{DK}^2 = \overline{DA}^2 + \overline{AK}^2$
$\overline{DK}^2 = 10^2 + 6.53^2$
$\overline{DK}^2 = 100 + 42.7$
$\overline{DK} = \sqrt{142.7}$
$\mathbf{\overline{DK} = 11,94}$

$\angle D = 90° - 57°$
$\mathbf{\angle D = 33°}$

Find the value of α that makes each statement true.

48. $sin\alpha = cos(3\alpha + 54°)$

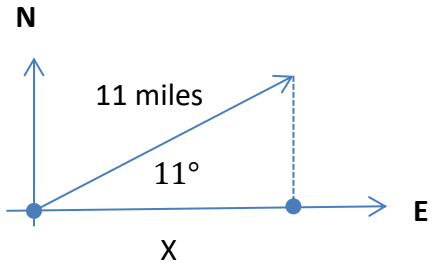
$sin\alpha = cos(3\alpha + 54°)$
$cos(90° - \alpha) = cos(3\alpha + 54°)$
$90° - \alpha = 3\alpha + 54°$
$4\alpha = 36°$
$\mathbf{\alpha = 9°}$

49. $cos\alpha = sin(\alpha - 60°)$

$cos\alpha = sin(\alpha - 60°)$
$sin\ (90° - \alpha) = sin(\alpha - 60°)$
$90° - \alpha = \alpha - 60°$
$2\alpha = 150°$
$\mathbf{\alpha = 75°}$

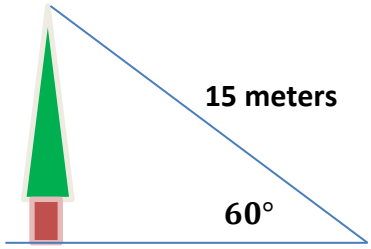
Unit 10 - Radical Expressions and Equations Review Guide

50. Andy walked 10 miles at an angle of $11°$ north of due east. To the nearest tenth of a mile, how far east, *x*, is Andy from his starting point?



$$cos11° = \frac{x}{11\ miles}$$
$$x = 11\ miles * cos11°$$
$$x = 11\ miles * 0.98$$
$$x = 10.79\ miles$$

51. A damaged tree is supported by a guy wire 15 meters long. The wire makes an angle of $60°$ with the ground. Calculate the height at which the guy wire is attached to the tree.



$$sin60° = \frac{h}{15\ meters}$$
$$h = 15\ meters * sin60°$$
$$h = 15\ meters * 0.86$$
$$h \approx 12.89\ meters$$