

SCORE: \_\_\_\_\_ / 140 POINTS

- ➔ YOU MUST SHOW LOGICAL, NEAT AND ORGANIZED WORK TO EARN FULL CREDIT (NO GUESS & CHECK)
- ➔ IT MUST BE CLEAR HOW YOU ARRIVED AT YOUR ANSWER
- ➔ PUT A BOX AROUND YOUR FINAL ANSWER
- ➔ ALL FINAL ANSWERS WHICH ARE RADICALS MUST BE SIMPLIFIED
- ➔ ALL FRACTIONS MUST BE IN SIMPLEST FORM

Write using fractional and/or negative exponents (where applicable).

SCORE: \_\_\_\_ / 8 POINTS

[a]  $(\sqrt[4]{n})^{17} = \boxed{n^{\frac{17}{4}}}$

[b]  $\sqrt[3]{b^{27}} = b^{\frac{27}{3}} = \boxed{b^9}$

[c]  $\frac{1}{\sqrt{p^{11}}} = \frac{1}{p^{\frac{11}{2}}} = \boxed{p^{-\frac{11}{2}}}$

Find the equation of the circle with center  $(7, -2)$  and radius 4.

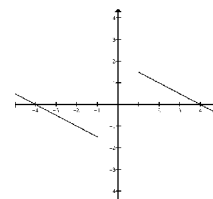
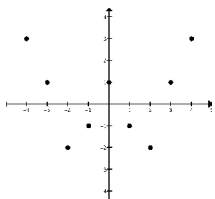
SCORE: \_\_\_\_ / 6 POINTS

$$(x-7)^2 + (y-(-2))^2 = 4^2$$

$$\boxed{(x-7)^2 + (y+2)^2 = 16}$$

Circle the **two** graphs below that represent functions.

SCORE: \_\_\_\_ / 6 POINTS



Simplify  $\sqrt{84r^{25}a^{36}v^{11}}$ . **Write your final answer using radicals.**

SCORE: \_\_\_\_ / 6 POINTS

$$\begin{aligned} &\sqrt{84}\sqrt{r^{25}}\sqrt{a^{36}}\sqrt{v^{11}} \\ &= (2\sqrt{21})(r^{12}\sqrt{r})(a^{18})(v^5\sqrt{v}) \\ &= \boxed{2r^{12}a^{18}v^5\sqrt{21rv}} \end{aligned}$$

Simplify  $\sqrt{252}$ .

SCORE: \_\_\_\_ / 6 POINTS

$$\begin{aligned} &\sqrt{2 \times 2 \times 3 \times 3 \times 7} \\ &= (2 \times 3)\sqrt{7} \\ &= \boxed{6\sqrt{7}} \end{aligned}$$

Find the center and radius of the circle  $x^2 + y^2 + 16x - 8y + 5 = 0$ .

SCORE: \_\_\_\_ / 8 POINTS

$$x^2 + 16x + y^2 - 8y = -5$$

$$x^2 + 16x + 64 + y^2 - 8y + 16 = -5 + 64 + 16$$

$$(x + 8)^2 + (y - 4)^2 = 75$$

CENTER:  $\boxed{(-8, 4)}$       RADIUS:  $\sqrt{75} = \boxed{5\sqrt{3}}$

Perform the indicated operations and simplify. Write your final answers using radicals.

SCORE: \_\_\_\_ / 14 POINTS

[a]  $\sqrt{21g^9} \sqrt{6g^{12}}$

$$= \sqrt{126} \sqrt{g^{21}}$$

$$= (3\sqrt{14})(g^{10} \sqrt{g})$$

$$= \boxed{3g^{10} \sqrt{14g}}$$

[b]  $(2\sqrt{2} + \sqrt{5})(\sqrt{15} - 3\sqrt{6})$

$$= 2\sqrt{30} - 6\sqrt{12} + \sqrt{75} - 3\sqrt{30}$$

$$= 2\sqrt{30} - 6(2\sqrt{3}) + 5\sqrt{3} - 3\sqrt{30}$$

$$= 2\sqrt{30} - 12\sqrt{3} + 5\sqrt{3} - 3\sqrt{30}$$

$$= \boxed{-\sqrt{30} - 7\sqrt{3}}$$

Perform the indicated operations and simplify. Write your final answers using fractional exponents.

SCORE: \_\_\_\_ / 10 POINTS

[a]  $\frac{\sqrt[6]{w}}{\sqrt[10]{w}}$

$$= \frac{w^{\frac{1}{6}}}{w^{\frac{1}{10}}}$$

$$= w^{\frac{1}{6} - \frac{1}{10}}$$

$$= w^{\frac{5}{30} - \frac{3}{30}}$$

$$= w^{\frac{2}{30}}$$

$$= \boxed{w^{\frac{1}{15}}}$$

[b]  $k^6 k^{\frac{5}{8}}$

$$= k^{6 + \frac{5}{8}}$$

$$= k^{\frac{48}{8} + \frac{5}{8}}$$

$$= \boxed{k^{\frac{53}{8}}}$$

Rationalize the denominator and simplify.

SCORE: \_\_\_\_ / 12 POINTS

[a]  $\frac{21}{5\sqrt{14}} = \frac{21}{5\sqrt{14}} \frac{\sqrt{14}}{\sqrt{14}} = \frac{21\sqrt{14}}{5(14)} = \frac{3\sqrt{14}}{5(2)} = \boxed{\frac{3\sqrt{14}}{10}}$

[b]  $\frac{27}{7 + \sqrt{13}} = \frac{27}{7 + \sqrt{13}} \frac{7 - \sqrt{13}}{7 - \sqrt{13}} = \frac{27(7 - \sqrt{13})}{7^2 - (\sqrt{13})^2}$

$$= \frac{27(7 - \sqrt{13})}{49 - 13} = \frac{27(7 - \sqrt{13})}{36}$$

$$= \frac{3(7 - \sqrt{13})}{4} = \boxed{\frac{21 - 3\sqrt{13}}{4}}$$

Find the distance between the points  $(-6, 5)$  and  $(-4, -3)$ . Write your final answer using radicals.

SCORE: \_\_\_\_ / 6 POINTS

$$\begin{aligned} & \sqrt{(-4 - (-6))^2 + (-3 - 5)^2} \\ &= \sqrt{2^2 + (-8)^2} \\ &= \sqrt{4 + 64} \\ &= \sqrt{68} \\ &= \boxed{2\sqrt{17}} \end{aligned}$$

Divide. Rationalize the denominator and simplify.

SCORE: \_\_\_\_ / 6 POINTS

$$\frac{\sqrt{5}}{\sqrt{90}} = \frac{\sqrt{5}}{\sqrt{5}\sqrt{18}} = \frac{1}{\sqrt{18}} = \frac{1}{3\sqrt{2}} = \frac{1}{3\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{3(2)} = \boxed{\frac{\sqrt{2}}{6}}$$

Translate the following sentence into an absolute value equation or inequality.

SCORE: \_\_\_\_ / 6 POINTS

“ $x$  is at least 10 away from 7”

**The distance between  $x$  and 7 is greater than or equal to 10**

$$\boxed{|x - 7| \geq 10}$$

If  $f(x) = 2x^2 - 5x - 6$ , find  $f(a - 3)$ .

SCORE: \_\_\_\_ / 8 POINTS

$$\begin{aligned} & 2(a - 3)^2 - 5(a - 3) - 6 \\ &= 2(a^2 - 6a + 9) - 5a + 15 - 6 \\ &= 2a^2 - 12a + 18 - 5a + 15 - 6 \\ &= \boxed{2a^2 - 17a + 27} \end{aligned}$$

The equation  $9 - |11 - 4x| = 2$  has two solutions. One solution is  $x = 1$ . Find the other solution.

SCORE: \_\_\_\_ / 8 POINTS

Check your answer.

$- 11 - 4x  = -7$	CHECK:	$9 - \left  11 - 4\left(\frac{9}{2}\right) \right $
$ 11 - 4x  = 7$		$= 9 -  11 - 18 $
$11 - 4x = 7$ OR $11 - 4x = -7$		$= 9 -  -7 $
$-4x = -4$ OR $-4x = -18$		$= 9 - 7$
$x = 1$ OR $\boxed{x = \frac{9}{2}}$		$= 2 \checkmark$

Solve the equation  $17 - 3\sqrt{h} = 5$  using algebra. Check your answer(s).

SCORE: \_\_\_\_ / 8 POINTS

$$-3\sqrt{h} = -12$$

$$\sqrt{h} = 4$$

$$(\sqrt{h})^2 = (4)^2$$

$$\boxed{h = 16}$$

$$\begin{aligned} \text{CHECK: } 17 - 3\sqrt{16} \\ &= 17 - 3(4) \\ &= 17 - 12 \\ &= 5 \checkmark \end{aligned}$$

Solve the equation  $m + \sqrt{31 - 6m} = 4$  using algebra. Check your answer(s).

SCORE: \_\_\_\_ / 12 POINTS

$$\sqrt{31 - 6m} = 4 - m$$

$$(\sqrt{31 - 6m})^2 = (4 - m)^2$$

$$31 - 6m = 16 - 8m + m^2$$

$$0 = m^2 - 2m - 15$$

$$0 = (m - 5)(m + 3)$$

$$m = 5 \text{ OR } \boxed{m = -3}$$

$$\begin{aligned} \text{CHECK: } m = 5 \\ 5 + \sqrt{31 - 6(5)} \\ &= 5 + \sqrt{31 - 30} \\ &= 5 + \sqrt{1} \\ &= 5 + 1 \\ &= 6 \times \end{aligned}$$

$$\begin{aligned} m = -3 \\ -3 + \sqrt{31 - 6(-3)} \\ &= -3 + \sqrt{31 + 18} \\ &= -3 + \sqrt{49} \\ &= -3 + 7 \\ &= 4 \checkmark \end{aligned}$$

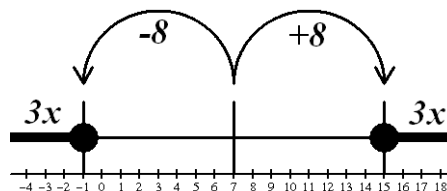
Solve  $|7 - 3x| \geq 8$ .

SCORE: \_\_\_\_ / 10 POINTS

The distance between 7 and  $3x$  is greater than or equal to 8

$$3x \leq -1 \quad \text{OR} \quad 3x \geq 15$$

$$\boxed{x \leq -\frac{1}{3} \quad \text{OR} \quad x \geq 5}$$



**ALTERNATE SOLUTION:**

$$7 - 3x \geq 8 \quad \text{OR} \quad 7 - 3x \leq -8$$

$$-3x \geq 1 \quad \text{OR} \quad -3x \leq -15$$

$$\boxed{x \leq -\frac{1}{3} \quad \text{OR} \quad x \geq 5}$$