

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

Simplify $\sqrt{54r^9a^7v^{16}}$. Write your final answer using radicals.

SCORE: ____ / 6 POINTS

$$\begin{aligned}
 &= \sqrt{54} \sqrt{r^9} \sqrt{a^7} \sqrt{v^{16}} \\
 &= 3\sqrt{6} r^4 \sqrt{r} a^3 \sqrt{a} v^8 \\
 &= \boxed{3r^4 a^3 v^8 \sqrt{6ra}}
 \end{aligned}$$

Find the equation of the circle with center $(-4, 3)$ and radius 9.

SCORE: ____ / 6 POINTS

$$\begin{aligned}
 (x - (-4))^2 + (y - 3)^2 &= 9^2 \\
 (x + 4)^2 + (y - 3)^2 &= 81
 \end{aligned}$$

Find the distance between the points $(-1, -7)$ and $(7, -3)$. Write your final answer using radicals.

SCORE: ____ / 6 POINTS

$$\begin{aligned}
 &\sqrt{(7 - (-1))^2 + (-3 - (-7))^2} \\
 &= \sqrt{8^2 + 4^2} \\
 &= \sqrt{64 + 16} \quad \rightarrow \quad = \sqrt{80} \\
 &= \boxed{4\sqrt{5}}
 \end{aligned}$$

The equation $8 - |9 - x| = 2$ has 2 solutions. One solution is $x = 3$. Find the other solution.

SCORE: ____ / 10 POINTS

Check your answer.

$$\begin{aligned}
 -|9 - x| &= -6 \\
 |9 - x| &= 6 \\
 9 - x &= 6 \quad \text{or} \quad 9 - x = -6 \\
 x &= 3 \quad \text{or} \quad \boxed{x = 15}
 \end{aligned}$$

$$\begin{aligned}
 \text{CHECK: } 8 - |9 - 15| \\
 &= 8 - |-6| \\
 &= 8 - 6 \\
 &= 2
 \end{aligned}$$

Rationalize the denominator and simplify.

SCORE: ___ / 12 POINTS

[a] $\frac{9}{4\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}}$

$$= \frac{9\sqrt{15}}{4 \cdot 15}$$

$$= \frac{3\sqrt{15}}{20}$$

[b] $\frac{15}{4+\sqrt{6}} \cdot \frac{4-\sqrt{6}}{4-\sqrt{6}}$

$$= \frac{15(4-\sqrt{6})}{16-6}$$

$$= \frac{15(4-\sqrt{6})}{10}$$

$$= \frac{3(4-\sqrt{6})}{2} \text{ or } \frac{12-3\sqrt{6}}{2}$$

Solve the equation $m + \sqrt{7-3m} = 1$ using algebra. Check your answer(s).

SCORE: ___ / 12 POINTS

$$\sqrt{7-3m} = 1-m$$

$$7-3m = 1-2m+m^2$$

$$0 = m^2+m-6$$

$$0 = (m+3)(m-2)$$

$$m = -3, 2$$

CHECK: $m = -3$

$$-3 + \sqrt{7-3(-3)}$$

$$= -3 + \sqrt{16}$$

$$= -3 + 4$$

$$= 1 \checkmark$$

$m = 2$

$$2 + \sqrt{7-3(2)}$$

$$= 2 + \sqrt{1}$$

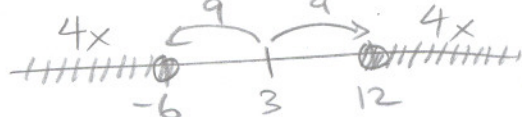
$$= 2 + 1$$

$$= 3 \times$$

Solve $|3-4x| \geq 9$.

SCORE: ___ / 10 POINTS

DISTANCE BETWEEN
3 AND $4x$ IS MORE THAN
OR EQUAL TO 9



$$4x \leq -6 \text{ or } 4x \geq 12$$

$$\left\{ x \leq -\frac{3}{2} \text{ or } x \geq 3 \right\}$$

OR

$$3-4x \geq 9 \text{ or } -(3-4x) \geq 9$$

$$-4x \geq 6 \text{ or } -3+4x \geq 9$$

$$x \leq -\frac{3}{2} \text{ or } 4x \geq 12$$

$$x \leq -\frac{3}{2} \text{ or } x \geq 3$$

$$\left\{ x \leq -\frac{3}{2} \text{ or } x \geq 3 \right\}$$

Simplify $\sqrt{240}$.

SCORE: ___ / 6 POINTS

$$\begin{array}{r} 2 \overline{)240} \\ 2 \overline{)120} \\ 2 \overline{)60} \\ 2 \overline{)30} \\ 3 \overline{)15} \\ 5 \overline{)5} \\ 1 \end{array}$$

$$4\sqrt{15}$$

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

SCORE: ___ / 14 POINTS

[a] $\sqrt{14g^{10}}\sqrt{6g^7}$

$$\begin{aligned} &= (\sqrt{14}g^5)(g^3\sqrt{6g}) \\ &= g^8\sqrt{84g} \\ &= \boxed{2g^8\sqrt{21g}} \end{aligned}$$

[b] $(2\sqrt{5} + \sqrt{3})(2\sqrt{6} - \sqrt{10})$

$$\begin{aligned} &= 4\sqrt{30} - 2\sqrt{50} + 2\sqrt{18} - \sqrt{30} \\ &= 3\sqrt{30} - 2(5\sqrt{2}) + 2(3\sqrt{2}) \\ &= 3\sqrt{30} - 10\sqrt{2} + 6\sqrt{2} \\ &= \boxed{3\sqrt{30} - 4\sqrt{2}} \end{aligned}$$

Solve the equation $11 - 2\sqrt{h} = 3$ using algebra. Check your answer(s).

SCORE: ___ / 8 POINTS

$$\begin{aligned} -2\sqrt{h} &= -8 \\ \sqrt{h} &= 4 \\ \boxed{h} &= \boxed{16} \end{aligned}$$

$$\begin{aligned} \text{CHECK: } 11 - 2\sqrt{16} & \\ &= 11 - 2(4) \\ &= 11 - 8 \\ &= 3 \checkmark \end{aligned}$$

Find the center and radius of the circle $x^2 + y^2 - 10x + 12y + 7 = 0$.

SCORE: ___ / 10 POINTS

$$\begin{aligned} x^2 - 10x + 25 + y^2 + 12y + 36 &= -7 + 25 + 36 \\ (x-5)^2 + (y+6)^2 &= 54 \end{aligned}$$

$$\begin{aligned} \text{CENTER} &= (5, -6) \\ \text{RADIUS} &= \sqrt{54} = 3\sqrt{6} \end{aligned}$$

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

SCORE: ___ / 10 POINTS

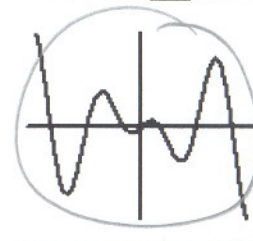
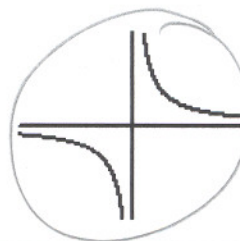
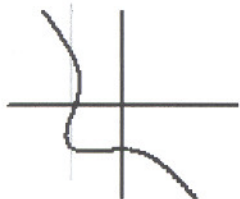
[a] $(\sqrt[3]{n})^{15} = n^{\frac{15}{3}} = n^5$

[b] $\sqrt[5]{b^{12}} = b^{\frac{12}{5}}$

[c] $\frac{1}{\sqrt{p^7}} = \frac{1}{p^{\frac{7}{2}}} = p^{-\frac{7}{2}}$

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

SCORE: ___ / 6 POINTS



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

SCORE: ___ / 10 POINTS

[a] $\frac{\sqrt[4]{w}}{\sqrt[10]{w}} = \frac{w^{\frac{1}{4}}}{w^{\frac{1}{10}}} = w^{\frac{1}{4} - \frac{1}{10}} = w^{\frac{5-2}{20}} = \boxed{w^{\frac{3}{20}}}$

[b] $k^8 k^{\frac{3}{4}} = k^{8 + \frac{3}{4}} = \boxed{k^{\frac{35}{4}}}$

If $f(x) = 3x^2 - 2x - 4$, find $f(a-2)$.

SCORE: ___ / 8 POINTS

$$\begin{aligned} f(a-2) &= 3(a-2)^2 - 2(a-2) - 4 \\ &= 3(a^2 - 4a + 4) - 2a + 4 - 4 \\ &= 3a^2 - 12a + 12 - 2a + 4 - 4 \\ &= \boxed{3a^2 - 14a + 12} \end{aligned}$$

Divide. Rationalize the denominator and simplify.

SCORE: ___ / 6 POINTS

$$\frac{\sqrt{7}}{\sqrt{84}} = \sqrt{\frac{7}{84}} = \sqrt{\frac{1}{12}} = \frac{\sqrt{1}}{\sqrt{12}} = \frac{1}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{2 \cdot 3} = \boxed{\frac{\sqrt{3}}{6}}$$