

You MUST show your work to receive any credit. This exam is worth 100 points. Each problem is worth 4 points.

**Multiply.**

1)  $\frac{x^2 - 11x - 12}{x^4} \cdot \frac{3x}{x - 12}$  1) \_\_\_\_\_

A)  $\frac{3(x-1)}{x^5}$

B)  $\frac{3(x+1)}{x^3}$

C)  $\frac{(x+1)}{3x^3}$

D)  $\frac{3(x-1)}{x^3}$

2)  $\frac{k^2 + 6k + 9}{k^2 + 12k + 27} \cdot \frac{k^2 + 9k}{k^2 + 10k + 21}$  2) \_\_\_\_\_

A)  $\frac{k}{k^2 + 12k + 27}$

B)  $\frac{k^2 + 9k}{k + 7}$

C)  $\frac{1}{k + 7}$

D)  $\frac{k}{k + 7}$

**Simplify, if possible.**

3)  $\frac{t^2 + 16}{t + 4}$  3) \_\_\_\_\_

A)  $\frac{t^2 + 16}{t + 4}$

B)  $t + 4$

C)  $t - 16$

D)  $t - 4$

4)  $\frac{m^2 - 9}{m^2 + 6m + 9}$  4) \_\_\_\_\_

A)  $\frac{1}{m + 3}$

B) 1

C)  $\frac{m + 3}{m - 3}$

D)  $\frac{m - 3}{m + 3}$

**Divide.**

5)  $\frac{z^2 - 4}{z} \div \frac{z - 2}{z - 7}$  5) \_\_\_\_\_

A)  $\frac{(z + 2)(z - 7)}{z}$

B)  $\frac{z}{(z + 2)(z - 7)}$

C)  $\frac{(z - 2)(z^2 - 2)}{z(z - 7)}$

D)  $(z + 2)(z - 7)$

6)  $\frac{x^2 - 100}{x^2 - 18x + 81} \div \frac{5x - 50}{x^2 - 5x - 36}$  6) \_\_\_\_\_

A)  $\frac{x - 9}{(x + 10)(x + 4)}$       B)  $\frac{(x - 10)(x - 4)}{5(x + 9)}$       C)  $\frac{(x + 10)(x + 4)}{x - 9}$       D)  $\frac{(x + 10)(x + 4)}{5(x - 9)}$

**Add or subtract. Simplify your answer to lowest terms.**

7)  $\frac{m^2 - 7m}{m - 4} + \frac{12}{m - 4}$  7) \_\_\_\_\_

A)  $\frac{m^2 - 7m + 12}{m - 4}$       B)  $m - 3$       C)  $m - 4$       D)  $m + 3$

**Evaluate the rational expression.**

8)  $\frac{9x + 6}{6x^2 - 7x + 3}$  when  $x = -4$  8) \_\_\_\_\_

A)  $\frac{42}{127}$       B)  $-\frac{42}{127}$       C)  $-\frac{30}{127}$       D)  $-\frac{6}{13}$

**Perform the indicated operation. Simplify, if possible.**

9)  $\frac{5p + 3}{4p^9q^6} + \frac{9p - 6}{2p^6q^5}$  9) \_\_\_\_\_

A)  $\frac{5p + 3 + 18 - 12p^3q}{4p^9q^6}$       B)  $\frac{5p + 3 + 18p^4q - 12p^3q}{4p^9q^6}$

C)  $\frac{5p + 3 + 18p^4q - 12}{4p^9q^6}$       D)  $\frac{5p + 3 + 9p^4q - 6p^3q}{4q^6p^9}$

10)  $\frac{7}{r} + \frac{8}{r - 4}$  10) \_\_\_\_\_

A)  $\frac{28r - 15}{r(4 - r)}$       B)  $\frac{28r - 15}{r(r - 4)}$       C)  $\frac{15r - 28}{r(r - 4)}$       D)  $\frac{15r - 28}{r(4 - r)}$

11)  $\frac{9x}{x^2 - 5x + 6} - \frac{36}{x^2 - 6x + 8}$  11) \_\_\_\_\_

A)  $\frac{9x - 36}{(x - 2)(x - 3)(x - 4)}$       B)  $\frac{9}{(x - 2)(x - 3)}$

C)  $\frac{9(x - 6)}{(x - 3)(x - 4)}$       D)  $\frac{x - 6}{(x - 3)(x - 4)}$

$$12) \frac{4}{m - n^2} + \frac{8}{n^2 - m}$$

12) \_\_\_\_\_

A)  $\frac{12}{m - n^2}$

B)  $\frac{-4}{m - n^2}$

C)  $\frac{4}{m - n^2}$

D)  $\frac{32}{m - n^2}$

**Simplify.**

$$13) \frac{\frac{7}{x} - \frac{x}{7}}{\frac{1}{7} - \frac{1}{x}}$$

13) \_\_\_\_\_

A)  $-(x - 7)$

B)  $7x(x + 7)$

C)  $x + 7$

D)  $-(x + 7)$

**Evaluate the square root, if possible.**

$$14) -\sqrt{\frac{81}{4}}$$

14) \_\_\_\_\_

A)  $-\frac{\sqrt{9}}{\sqrt{2}}$

B)  $-\frac{9}{2}$

C) 4

D)  $-\frac{\sqrt{9}}{2}$

**Simplify. Assume variables represent nonnegative numbers.**

$$15) \sqrt{\frac{484x^2y^8}{361z^6}}$$

15) \_\_\_\_\_

A)  $\frac{22xy^4}{20z^3}$

B)  $\frac{22xy^4}{19z^3}$

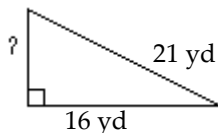
C)  $\frac{23xy^4}{19z^3}$

D)  $\frac{242xy^4}{180z^3}$

**Solve the problem.**

16) The diagram below shows a rope connecting the top of a pole to the ground. How tall is the pole?

16) \_\_\_\_\_



A)  $\sqrt{185}$  yd  $\approx$  92.5 yd

B)  $\sqrt{185}$  yd  $\approx$  13.6 yd

C)  $\sqrt{5}$  yd  $\approx$  2.2 yd

D)  $\sqrt{697}$  yd  $\approx$  26.4 yd

**Simplify.**

$$17) \sqrt{150x^3y^5}$$

17) \_\_\_\_\_

A)  $150xy$

B)  $5xy^2\sqrt{6xy}$

C)  $6x^2\sqrt{5y}$

D)  $5xy\sqrt{6xy}$

**Multiply and, if possible, simplify. Assume that all variables represent nonnegative numbers.**

18)  $\sqrt{18qrs} \cdot \sqrt{72q^3rs^5}$

A)  $72q^3rs^5$

B)  $18q^4r^2s^6$

C)  $36q^2rs^3$

D)  $18\sqrt{2q^2rs^3}$

18) \_\_\_\_\_

19)  $\sqrt{2x^2y} \cdot \sqrt{10x^7y^6}$

A)  $2x^4y^3\sqrt{5xy}$

B)  $2\sqrt{5x^9y^7}$

C)  $4x^8y^6\sqrt{5xy}$

D)  $2x^4y^3\sqrt{5}$

19) \_\_\_\_\_

**Simplify the square roots, then combine like radicals.**

20)  $-3\sqrt{6} - 7\sqrt{54}$

A)  $-24\sqrt{6}$

B)  $24\sqrt{6}$

C)  $6\sqrt{6}$

D)  $-10\sqrt{6}$

20) \_\_\_\_\_

**Simplify.**

21)  $-18\sqrt{17} - 6\sqrt{17}$

A)  $13\sqrt{17}$

B)  $-12\sqrt{17}$

C)  $23\sqrt{17}$

D)  $-24\sqrt{17}$

21) \_\_\_\_\_

**Multiply.**

22)  $(\sqrt{6x} - 3)(\sqrt{2x} + 3)$

A)  $x\sqrt{6} - 6\sqrt{(8)x} + 3\sqrt{6x} - 9$

C)  $2x\sqrt{3} - \sqrt{2x} + \sqrt{6x} - 9$

B)  $\sqrt{3} - 3\sqrt{2x} + 3\sqrt{6x} + 9$

D)  $2x\sqrt{3} - 3\sqrt{2x} + 3\sqrt{6x} - 9$

22) \_\_\_\_\_

23)  $6\sqrt{7}(\sqrt{11} + \sqrt{7})$

A)  $6\sqrt{77} + 7$

B)  $6\sqrt{77} + 42$

C)  $6\sqrt{11} + 7$

D)  $42\sqrt{11} + 42$

23) \_\_\_\_\_

**Simplify. Assume variables represent nonnegative numbers.**

24)  $\sqrt[3]{125}$

A) 11

B) 5

C)  $\pm 5$

D) 25

24) \_\_\_\_\_

**Solve.**

25)  $\sqrt{x} = 4$

A) 8

B) 4

C) 16

D) -16

25) \_\_\_\_\_