INTERMEDIATE ALGEBRA   EXAM 3 T*   NAME ______________________

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers. TURN IN ALL WORKSHEETS. CALCULATORS ARE PERMITTED ON THIS TEST.

In 1-8, simplify completely:

1a) $\sqrt{16X^4Y^{16}}$ 2a) $\sqrt{200}$ 3a) $\sqrt{20X^9Y^{12}}$

b) $\sqrt[5]{32a^{20}}$ b) $\sqrt[3]{54}$ b) $\sqrt[3]{72X^{12}Y^{10}}$

In 4-5, give a) radical form b) decimal approximation.

4. $\dfrac{3\sqrt{24} - 8\sqrt{27}}{12}$ 5. $(6\sqrt{3} - 3\sqrt{6})^2$

In 6 - 7, rationalize the denominators:

6a) $\dfrac{21}{\sqrt{12}}$ b) $\sqrt[3]{\dfrac{5}{X}}$ 7. $\dfrac{20}{3\sqrt{6} - 2}$

8. Simplify:

a) $64^{\frac{2}{3}}$ b) $64^{-\frac{2}{3}}$ c) $-25^{\frac{1}{2}}$ d) $(-32)^{-\frac{2}{5}}$ e) $\left(\frac{-64}{27}\right)^{\frac{2}{3}}$

In 9 - 12, solve for X, and give interval notation if appropriate:

9. $|3X - 9| \leq 12$

10a) $|3X - 9| < -12$

b) $|3X - 9| \geq -12$

11. $|X + 6| > 6$

12. $\left|\frac{X - 3}{5}\right| \geq 2$

In 13 - 16, solve for X, check if necessary:

13. $(X + 3)^2 = 7$

14. $X^2 - 6X - 2 = 0$

15. $X(X - 6) = -10$

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

17. Find the diagonal of a rectangle whose width is 8 ft, and whose length is 15 feet.

18. The guy wire to the top of a of a pole is 73 feet long. If it reaches the ground 20 feet from the base of the pole, how tall is the pole? (Nearest hundredth, if necessary!)

INTER. ALG. EXAM 3 T* Solutions

1a) $\sqrt{16x^4y^{16}}$
$= 4x^2y^8$

c) $\sqrt[5]{32a^{20}}$
$= 2a^4$

2a) $\sqrt{200} = \sqrt{100}\sqrt{2}$
$= 10\sqrt{2}$

b) $\sqrt[3]{54} = \sqrt[3]{27}\sqrt[3]{2}$
$= 3\sqrt[3]{2}$

3a) $\sqrt{20x^9y^{12}}$
$= \sqrt{4x^8y^{12}}\sqrt{5x}$
$= 2x^4y^6\sqrt{5x}$

b) $\sqrt[3]{72x^{12}y^{10}}$
$= \sqrt[3]{8x^{12}y^9}\sqrt[3]{9y}$
$= 2x^4y^3\sqrt[3]{9y}$

4. $\dfrac{3\sqrt{24} - 8\sqrt{27}}{12}$
$= \dfrac{3\cdot 2\sqrt{6} - 8\cdot 3\sqrt{3}}{12}$
$= \dfrac{6\sqrt{6} - 24\sqrt{3}}{12}$
$= \dfrac{\cancel{6}(\sqrt{6} - 4\sqrt{3})}{\cancel{12}\,2}$
$= \dfrac{\sqrt{6} - 4\sqrt{3}}{2}$ -2.24

5. $(6\sqrt{3} - 3\sqrt{6})^2$
$= 36\cdot 3 - 36\sqrt{18} + 9\cdot 6$
$= 108 - 36\cdot 3\sqrt{2} + 54$
$= 162 - 108\sqrt{2}$ 9.26

6a) $\dfrac{21}{\sqrt{12}} = \dfrac{21}{2\sqrt{3}}\dfrac{\sqrt{3}}{\sqrt{3}}$
$= \dfrac{21\sqrt{3}}{6}$
$= \dfrac{7\sqrt{3}}{2}$

b) $\sqrt[3]{\dfrac{5}{x}} = \dfrac{\sqrt[3]{5}\sqrt[3]{x^2}}{\sqrt[3]{x}\sqrt[3]{x^2}}$
$= \dfrac{\sqrt[3]{5x^2}}{\sqrt[3]{x^3}}$
$= \dfrac{\sqrt[3]{5x^2}}{x}$

7. $\dfrac{20}{(3\sqrt{6}-2)}\dfrac{(3\sqrt{6}+2)}{(3\sqrt{6}+2)}$
$= \dfrac{20(3\sqrt{6}+2)}{9\cdot 6 - 4}$
$= \dfrac{20(3\sqrt{6}+2)}{50}$
$= \dfrac{2(3\sqrt{6}+2)}{5}$

8a) $64^{2/3} = (\sqrt[3]{64})^2$
$= 4^2 = 16$

b) $64^{-2/3} = \dfrac{1}{16}$

c) $-25^{1/2} = -\sqrt{25}$
$= -5$

d) $(-32)^{-2/5} = (\sqrt[5]{-32})^{-2}$
$= (-2)^{-2} = \dfrac{1}{(-2)^2} = \dfrac{1}{4}$

e) $\left(-\dfrac{64}{27}\right)^{2/3} = \left(\sqrt[3]{-\dfrac{64}{27}}\right)^2 = \left(-\dfrac{4}{3}\right)^2 = \dfrac{16}{9}$

9. $|3x-9| \le 12$ Between
$3x-9 = 12$ $3x-9 = -12$
$3x = 21$ $3x = -3$
$x = 7$ $x = -1$
$[-1, 7]$

10a) $|3x-9| < -12$
No Sol.

b) $|3x-9| \ge 12$
All Reals
$(-\infty, \infty)$

11. $|x+6| > 6$ EXTREMES!
$x+6 = 6$ $x+6 = -6$
$x = 0$ $x = -12$
$(-\infty, -12) \cup (0, \infty)$

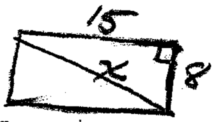
12. $\left|\dfrac{x-3}{5}\right| \ge 2$ EXTREMES!
$\cancel{5}\left(\dfrac{x-3}{\cancel{5}}\right) = 2\cdot 5$ $\cancel{5}\left(\dfrac{x-3}{\cancel{5}}\right) = 5(-2)$
$x-3 = 10$ $x-3 = -10$
$x = 13$ $x = -7$
$(-\infty, -7] \cup [13, \infty)$

13. $(x+3)^2 = 7$
$x+3 = \pm\sqrt{7}$
$x = -3 \pm \sqrt{7}$

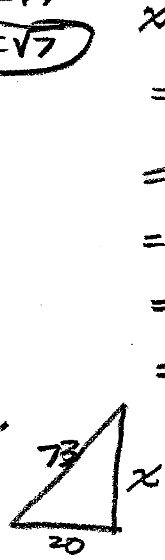
14. $x^2 - 6x - 2 = 0$
$a=1$ $b=-6$ $c=-2$
$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$
$= \dfrac{6 \pm \sqrt{36-4(1)(-2)}}{2}$
$= \dfrac{6 \pm \sqrt{36+8}}{2}$ $\sqrt{44}$
$= \dfrac{6 \pm 2\sqrt{11}}{2}$
$= \dfrac{\cancel{2}(3 \pm \sqrt{11})}{\cancel{2}}$
$= 3 \pm \sqrt{11}$

15. $x(x-6) = -10$
$x^2 - 6x + 10 = 0$
$a=1$ $b=-6$ $c=10$
$x = \dfrac{6 \pm \sqrt{36-40}}{2}$
$= \dfrac{6 \pm \sqrt{-4}}{2}$
$= \dfrac{6 \pm 2i}{2}$
$= \dfrac{\cancel{2}(3 \pm i)}{\cancel{2}}$
$= 3 \pm i$

16. $(x-3)^2 = (\sqrt{x+3})^2$
$x^2 - 6x + 9 = x + 3$
$-x-3$ $-x-3$
$x^2 - 7x + 6 = 0$
$(x-6)(x-1) = 0$
$x = 6$ ~~x = 1~~ Reject!

17.


$8^2 + 15^2 = x^2$
$64 + 225 = x^2$
$x^2 = 289$
$x = \pm 17$
$x = 17$ ft

18.


$x^2 + 20^2 = 78^2$
$x^2 + 400 = 5329$
$x^2 = 4929$
$x = \pm\sqrt{4929}$
$x = 70.21$ ft