

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) $\sqrt{169x^{10}}$ 2a) $\sqrt{20x^9y^{14}}$ 3. $5\sqrt{10}(3\sqrt{15} - 8\sqrt{30})$

b) $\sqrt[4]{81x^4y^{12}}$ b) $\sqrt[3]{250x^9y^{14}}$

In 4- 5, a) Give simplest radical form.
 b) Calculate to nearest hundredth.

4. $\sqrt[3]{35} \cdot \sqrt[3]{98}$ 5. $(4\sqrt{3} + 2\sqrt{6})^2$

In 6 - 7, rationalize the denominators:

6. $\frac{5\sqrt{5}}{\sqrt{5} - 5}$ 7. $\frac{12}{\sqrt[3]{3}}$

8. Simplify:

a) $81^{\frac{3}{4}}$ b) $8^{-\frac{2}{3}}$ c) $\left(-\frac{8}{125}\right)^{-\frac{2}{3}}$ d) $(-9)^{\frac{3}{2}}$ e) $-16^{\frac{3}{2}}$

In 9 - 11, solve for x , graph on a number line, and give interval notation.

9a) $|6x + 2| < 14$ 10a) $|6x + 2| > -14$ 11a) $\left|\frac{2x - 4}{3}\right| \leq 6$

b) $|6x + 2| \geq 14$ b) $|6x + 2| \leq -14$ b) $\left|\frac{2x - 4}{3}\right| > 6$

In 12 - 17, solve for X , using complex numbers if necessary:

12. $X^2 - 12x + 20 = 0$ 13. $X^2 = 5 + 4X$

14. $(X + 5)^2 = 3$

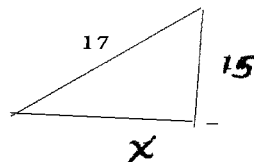
15. $X^2 + 3x - 5 = 0$

16. $2X(X - 1) = -1$

17. $\sqrt[3]{2X + 15} = 3$

18. $\sqrt{2X + 15} = 2X + 3$

19. Find x:



20. Find the diagonal of a rectangle whose width is 5 m. and whose length is 10 m.

21. A 10 foot ladder reaches the ground 6 feet from the base of a wall. How high on the wall does the ladder reach?

INTERMEDIATE ALG EXAM 3E* Solutions

1a) $\sqrt{169 \times 10}$
 $= 13 \times \sqrt{10}$
 b) $\sqrt[4]{81 \times 4 \times 12}$
 $= 3 \times \sqrt[4]{4 \times 3}$

2a) $\sqrt{20 \times 9 \times 14}$
 $= \sqrt{4 \times 8 \times 9 \times 14} = \sqrt{4 \times 8 \times 14} \times \sqrt{9}$
 $= 2 \times \sqrt[4]{8 \times 14} \times 3 = 6 \sqrt[4]{112}$

b) $\sqrt[3]{250 \times 9 \times 14}$
 $= \sqrt[3]{125 \times 9 \times 14} = \sqrt[3]{125} \times \sqrt[3]{9 \times 14}$
 $= 5 \times \sqrt[3]{126}$

3. $5\sqrt{10}(3\sqrt{15} - 8\sqrt{30})$
 $= 15\sqrt{150} - 40\sqrt{300}$
 $= 15 \cdot \sqrt{25 \cdot 6} - 40 \cdot \sqrt{100 \cdot 3}$
 $= 15 \cdot 5 \cdot \sqrt{6} - 40 \cdot 10 \sqrt{3}$
 $= 75\sqrt{6} - 400\sqrt{3}$

4. $\sqrt[3]{35 \cdot \sqrt[3]{98}}$
 $= \sqrt[3]{7 \cdot 5 \cdot 2 \cdot 7^2}$
 $= \sqrt[3]{7^3 \cdot 5 \cdot 2}$
 $= 7 \sqrt[3]{10}$
 $= 15.08$

5. $(4\sqrt{3} + 2\sqrt{6})(4\sqrt{3} + 2\sqrt{6})$
 $= 16 \cdot 3 + 8\sqrt{18} + 8\sqrt{18} + 4 \cdot 6$
 $= 48 + 16\sqrt{18} + 24$
 $= 72 + 16\sqrt{9 \cdot 2}$
 $= 72 + 16 \cdot 3\sqrt{2} = 72 + 48\sqrt{2}$

6. $\frac{5\sqrt{5}(\sqrt{5}+5)}{(\sqrt{5}-5)(\sqrt{5}+5)}$
 $= \frac{5 \cdot 5 + 25\sqrt{5}}{5 - 25}$
 $= \frac{25(1 + \sqrt{5})}{-20}$
 $= -\frac{5(1 + \sqrt{5})}{4}$

7. $\frac{12 \sqrt[3]{9}}{\sqrt[3]{3} \sqrt[3]{9}}$
 $= \frac{12 \sqrt[3]{9}}{3}$
 $= 4 \sqrt[3]{9}$

8a) $81^{3/4} = (\sqrt[4]{81})^3 = 3^3 = 27$
 b) $8^{-1/3} = (\sqrt[3]{8})^{-1} = 2^{-1} = \frac{1}{2}$
 c) $(-\frac{8}{125})^{-2/3} = (\sqrt[3]{-\frac{8}{125}})^{-2}$
 $= (\frac{-2}{5})^{-2} = (\frac{-5}{2})^2 = \frac{25}{4}$
 d) $(-9)^{3/2} = (\sqrt{-9})^3 = \text{No Real}$
 e) $-16^{3/2} = -(\sqrt{16})^3 = -64$

9a) $|6x+2| < 14$
 Betweenness.
 $6x+2=14 \Rightarrow 6x=12 \Rightarrow x=2$
 $6x+2=-14 \Rightarrow 6x=-16 \Rightarrow x=-\frac{16}{6} = -\frac{8}{3}$
 Solution: $(-\frac{8}{3}, 2)$

10a) $|6x+2| > -14$
 All Reals
 $(-\infty, \infty)$
 b) $|6x+2| < -14$
 No Solution

10b) $|6x+2| \geq 14$ EXTREMES
 $(-\infty, -\frac{8}{3}] \cup [2, \infty)$

11a) $|\frac{2x-4}{3}| \leq 6$
 Betweenness
 $\frac{2x-4}{3} = 6 \Rightarrow 2x-4=18 \Rightarrow 2x=22 \Rightarrow x=11$
 $\frac{2x-4}{3} = -6 \Rightarrow 2x-4=-18 \Rightarrow 2x=-14 \Rightarrow x=-7$
 Solution: $[-7, 11]$

11b) $|\frac{2x-4}{3}| > 6$
 Extremes
 $(-\infty, -7) \cup (11, \infty)$

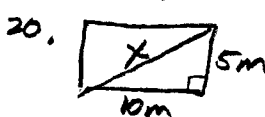
12. $x^2 - 12x + 20 = 0$
 $(x-10)(x-2) = 0$
 $x=10, x=2$

13. $x^2 - 4x - 5 = 0$
 $(x-5)(x+1) = 0$
 $x=5, x=-1$

14. $(x+5)^2 = 3$
 $x+5 = \pm \sqrt{3}$
 $x = -5 \pm \sqrt{3}$

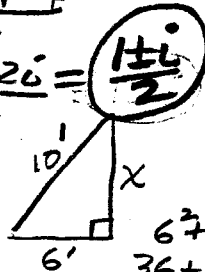
17. $(\sqrt[3]{2x+15})^3 = (3)^3$
 $2x+15=27$
 $2x=12$
 $x=6$

Ch: $\sqrt[3]{12+15} = 3$
 $\sqrt[3]{27} = 3$



20. $5^2 + 10^2 = x^2$
 $25 + 100 = x^2$
 $x^2 = 125$
 $x = 5\sqrt{5} \text{ m.}$

16. $2x(x-1) = -1$
 $2x^2 - 2x + 1 = 0$
 $a=2, b=-2, c=1$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $= \frac{2 \pm \sqrt{4 - 4(2)(1)}}{2(2)}$
 $= \frac{2 \pm \sqrt{-4}}{4}$
 $= \frac{2 \pm 2i}{4} = \frac{1 \pm i}{2}$



21. $6^2 + x^2 = 10^2$
 $36 + x^2 = 100$
 $x^2 = 64$
 $x = 8 \text{ ft.}$

15. $x^2 + 3x - 5 = 0$
 $a=1, b=3, c=-5$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $= \frac{-3 \pm \sqrt{9 - 4(1)(-5)}}{2(1)}$
 $= \frac{-3 \pm \sqrt{29}}{2}$

18. $(\sqrt{2x+15})^2 = (2x+3)^2$
 $2x+15 = 4x^2 + 12x + 9$
 $0 = 4x^2 + 10x - 6$
 $0 = 2(2x^2 + 5x - 3)$
 $(2x-1)(x+3)$
 $x = \frac{1}{2}, x = -3$

19.
 $x^2 + 15^2 = 17^2$
 $x^2 + 225 = 289$
 $x^2 = 64$
 $x = \pm 8$
 $x = 8$

$\sqrt{1+15} = 1+3$
 $\sqrt{16} = 4 \checkmark$
 $\sqrt{-6+15} = -6+3$
 $\sqrt{9} = -3$ Reject!