

2002 Palm Harbor Invitational Algebra I Individual Solutions

1. $5x+3=-17$
 $5x=-20$
 $x=-4$
 Answer: -4; A
2. $y=4*(-2)^2y-5*(-2)+5$
 $y=16y+10+5$
 $-15y=15$
 $y=-1$
 Answer: -1; B
3. True: ii, iv
 Answer: 2; B
4. $(2x^3+3x)(6x^4+2)$
 $2x^3*6x^4+3x*6x^4+2x^3*2+3x*2$
 $12x^7+18x^5+4x^3+6x$
 Answer: $12x^7+18x^5+4x^3+6x$; A
5. Follow order of operations:
 $4^{3^2} = 4^{(3^2)} = 4^9 = 262,144$
 Answer: 262,144; D
6. Quadrants are numbered clockwise starting in the top right.
 Answer: II; B
7. $\frac{x^3+xz-y+z^2}{xyz} = \frac{3^3+3*1+2+1^2}{3*-2*1} = \frac{\frac{1}{9}+6}{-6} = \frac{\frac{55}{9}}{-6} = -\frac{55}{54}$
 Answer: $-\frac{55}{54}$; B
8. $-2x+7>5$
 $-2x>-2$
 $x<1$
 Answer: $x<1$; E
9. Find discriminant: $b^2-4ac=6^2-4*1*9=0$
 Answer: 1; B
10. Undefined is when the denominator is 0, which is when $x=2$ and -3
 Answer: -3 and 2; A
11.
 $\sqrt{x+5} + \sqrt{x+5} = 5$
 $2\sqrt{x+5} = 5$
 $\sqrt{x+5} = 2.5$
 $x+5 = 6.25$
 $x = 1.25$
 Answer: $x=1.25$; C
12. True: i
 Answer: 1; A
13. $-b/a=-2/1=-2$
 Also could be solved by dividing by $x-2$ using polynomial long division or synthetic division and then factoring the resulting quadratic.
 Answer: -2; B
14. Distributive property of multiplication over addition
 Answer: Distributive; A
15. $(x+y)^3=(x^2+2xy+y^2)(x+y)=x^3+3x^2y+3xy^2+y^3$
 Answer: $x^3+3x^2y+3xy^2+y^3$; D
16. $9x-5y=7$
 $9x-7=5y$
 $\frac{9x-7}{5} = \frac{7}{5} = y$
 Answer: $\frac{9}{5}$; E
17. $18x^2+9x-2=(3x+2)(6x-1)$
 But if you are sneaky you might notice $AC=18$ when you multiply the factors and $BD=-2$
 $AC-BD=18+2=20$
 Answer: 20; C
18. Harmonic mean:
 $\frac{2ab}{a+b} = \frac{2*4*12}{4+12} = \frac{96}{16} = 6$
 Or let the distance be x
 Since $\frac{D}{R} = T$, the total time in hours for the trip is $\frac{x}{4} + \frac{x}{12} = \frac{x}{3}$. Average speed is the total distance divided by the total time: $\frac{2x}{\frac{x}{3}} = 6$ mph
 Answer: 6 mph; A

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19. Substitution:

$$18x - 6y = 3$$

$$6x - 2y = 1$$

$$\frac{6x - 1}{2} = y$$

$$-5x + 2 * \frac{6x - 1}{2} = -5$$

$$-5x + 6x - 1 = -5$$

$$x = -4$$

$$y = -12.5$$

$$x + 2y = -4 + 2 * -12.5 = -29$$

Answer: -29; A

20.

$$2x^2 - 3x - 5 = \frac{2(x^3 + x^2 + x)}{x} - 5x - 7$$

$$2x^2 - 3x - 5 = 2x^2 + 2x + 2 - 5x - 7, x \neq 0$$

0=0 Therefore, all real numbers are solutions except 0 because the original expression is undefined when x=0.

Answer: all real #'s except 0; E

21. Let x=0; y=6x²-11x+4=4

Answer: 4; D

22. Apply the Pythagorean Theorem twice.

$$\sqrt{12^2 + 4^2} + 3^2 = \sqrt{169} = 13$$

Answer: 13 u; D

23. $x\sqrt{x^2} = x * |x|$

Answer: $x * |x|$; E

24. x=correct measurement

$$\text{Area of new carpet} = \$45 / \$3 = 15 \text{ ft}^2$$

$$15 = (x+1)^2 - x^2$$

$$15 = x^2 + 2x + 1 - x^2$$

$$14 = 2x$$

$$7 = x$$

Answer: 7 feet; A

25.

$$\sqrt{\sqrt{-x}} = 2$$

$$\sqrt{-x} = 4$$

$$-x = 16$$

$$x = -16$$

Answer: -16; A

26. First, factor out an x.

$$x^3 - 2x^2 + 3x = x(x^2 - 2x + 3)$$

Use discriminate to tell if the quadratic can be factored. $b^2 - 4ac = 2^2 - 4 * 1 * 3 = -8$
Therefore, it cannot be factored further.

Answer: $x(x^2 - 2x + 3)$; D

27. Make sure to subtract 1.

$$6x^2 - 7x + 7 = 0$$

$$b^2 - 4ac = (-7)^2 - 4 * 6 * 7 = -119$$

Answer: -119; B

28.

$$\frac{7}{x - 3} = y^2$$

$$\sqrt{\frac{7}{x - 3}} = \sqrt{y^2}$$

$$\frac{\sqrt{7(x - 3)}}{x - 3} = |y|$$

$$\pm \frac{\sqrt{7(x - 3)}}{x - 3} = y$$

Answer: $\pm \frac{\sqrt{7(x - 3)}}{x - 3}$; B

29.

$$\frac{1 - \frac{1}{x}}{\frac{x+1}{x^2-1}} = \frac{\frac{x-1}{x(x+1)}}{\frac{(x+1)(x-1)}{x}} = \frac{x-1}{x(x+1)} * \frac{x}{(x+1)(x-1)} = \frac{1}{(x+1)^2}$$

Answer: $\frac{1}{(x+1)^2}$; B

30.

$$|x^2 - x - 1| = |x|$$

$$x^2 - x - 1 = x \text{ or } x^2 - x - 1 = -x$$

$$x^2 - 2x - 1 = 0 \text{ or } x^2 - 1 = 0$$

$$x = 1 + \sqrt{2} \text{ or } 1 - \sqrt{2} \text{ or } -1 \text{ or } 1$$

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

Answer: 2; D