Key Spr '17

Honors Math 2 **HW for Unit 1 Test 1 Review**

Show your work by hand for the problems for credit!

Part I. Simplify each expression

1. $(x - 6)^2$

$(x-6)(x-6)$

$x^2-12x+36$

2. $(3x + 4)^2$

$(3x+4)(3x+4)$

$9x^2+24x+16$

3. $(5x^4 - 3 - 5x^2) - (4 - 3x^4 + 7x)$

$5x^4-5x^2-3$
$+3x^4 \quad -4 -7x$

$8x^4-5x^2-7x-7$

Part II. Solve each equation by factoring

4. $2x^2 + 5x + 3 = 0$

$(2x+3)(x+1)=0$

$x=\frac{-3}{2}, -1$

5. $5x^2 - 45x + 90 = 0$

$5(x^2-9x+18)=0$

$5(x-3)(x-6)=0$

$x=3,6$

6. $12d^2 - 71d - 6 = 0$

$12d^2-72d+d-6=0$

$12d(d-6)+1(d-6)=0$

$(12d+1)(d-6)=0$

$d=-1/12, 6$

7. $2x^2 = 6x$

$2x^2-6x=0$

$2x(x-3)=0$

$x=0,3$

8. $4p^2 + 9 = 12p$

$4p^2-12p+9=0$

$(2p-3)(2p-3)=0$

$p=3/2$ "double root"

9. $16x^2 - 64 = 0$

$16(x^2-4)=0$

$16(x-2)(x+2)=0$

$x=2,-2$

Part III. Solve by completing the square

10. $2x^2 - 5x + 3 = 0$

$\frac{2x^2}{2}-\frac{5x}{2}=\frac{-3}{2}$

$\left(\frac{1}{2}\right)^2=\left(-\frac{5}{2}\cdot\frac{1}{2}\right)^2=\frac{25}{16}$

$x^2-\frac{5}{2}x+\frac{25}{16}=\frac{-3}{2}+\frac{25}{16}$

$\left(x-\frac{5}{4}\right)^2=\frac{1}{16}$

$x-\frac{5}{4}=\pm\sqrt{\frac{1}{16}}$

$x=\frac{5}{4}\pm\frac{1}{4}$

$x=3/2, 1$

11. $x^2 + 11 = -4x$

$x^2+4x+4=-11+4$

$(x+2)^2=-7$

$x+2=\pm\sqrt{-7}$

$x=-2\pm i\sqrt{7}$

Part IV: Find the value of the discriminant and describe the nature of the roots.

12. $2x^2 + 7x - 11 = 0$

$7^2-4(2)(-11)$

$49+88$

137

2 real, irrational solutions

13. $2x^2 - 13x = 7$

$2x^2-13x-7=0$

$(-13)^2-4(2)(-7)$

$169+56$

225

2 real, rational solutions

14. $7x^2 + 6x + 2 = 0$

$6^2-4(7)(2)$

$36-56$

-20

2 imaginary solutions

Part V: Solve by using the quadratic formula.

15. $3x^2 + 5x - 1 = 0$

$\frac{-5 \pm \sqrt{(5)^2 - 4(3)(-1)}}{2(3)}$

$\frac{-5 \pm \sqrt{25+12}}{6}$

$x = \frac{-5 \pm \sqrt{37}}{6}$

16. $-3x^2 + 4x = 4$

$-3x^2 + 4x - 4 = 0$

$\frac{-4 \pm \sqrt{(4)^2 - 4(-3)(-4)}}{2(-3)}$

$\frac{-4 \pm \sqrt{16-48}}{-6} = \frac{-4 \pm \sqrt{-32}}{-6}$

$\frac{-4 \pm 4i\sqrt{2}}{-6}$ GCF of -2

$x = \frac{2 \pm 2i\sqrt{2}}{3}$

17. $x^2 + 7 = 3x$

$x^2 - 3x + 7 = 0$

$\frac{3 \pm \sqrt{(-3)^2 - 4(1)(7)}}{2(1)}$

$\frac{3 \pm \sqrt{9-28}}{2} = \frac{3 \pm \sqrt{-19}}{2}$

$\frac{3 \pm i\sqrt{19}}{2}$

Part VI: Factor Completely

18. $x^3 - 4x^2 + 3x - 12$

$x^2(x-4) + 3(x-4)$

$(x^2+3)(x-4)$

19. $24x^3 - 2x^2 - 12x$

$2x(12x^2 - x - 6)$

$2x(12x^2 - 9x + 8x - 6)$

$2x(3x(4x-3) + 2(4x-3))$

$2x(3x+2)(4x-3)$

20. $x^4 - 16$

$(x^2+4)(x^2-4)$

$(x^2+4)(x+2)(x-2)$

Part VII: Simplify the following Radicals

21. $\sqrt{180}$

$\sqrt{36}\sqrt{5}$

$6\sqrt{5}$

22. $-\sqrt{-250}$

$-i\sqrt{125}\sqrt{2}$

$-i\sqrt{25}\sqrt{5}\sqrt{2}$

$-5i\sqrt{10}$

23. $2\sqrt{-18} \cdot 4\sqrt{-48}$

$2i\sqrt{18} \cdot 4i\sqrt{48}$

$2i\sqrt{9}\sqrt{2} \cdot 4i\sqrt{16}\sqrt{3}$

$6i\sqrt{2} \cdot 16i\sqrt{3}$

$96i^2\sqrt{6}$ $-96\sqrt{6}$

24. $\sqrt{\frac{7}{2}} = \frac{\sqrt{7}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\frac{\sqrt{14}}{\sqrt{4}}$ $\frac{\sqrt{14}}{2}$

Part VIII: Find the zeros of the following. Show all your work using the appropriate method.

25. $x^2 - 9x + 12 = 0$

$x = \frac{9 \pm \sqrt{(-9)^2 - 4(1)(12)}}{2(1)} = \frac{9 \pm \sqrt{81-48}}{2}$

$x = \frac{9 \pm \sqrt{33}}{2}$

Not factorable, and has "b" term, so can do Quadratic formula or complete the Square

26. $3x^2 - 54 = 0$

No "b" term ↓ use Solve by Square Roots

$3x^2 = 54$

$x^2 = 18$

$x = \pm\sqrt{18}$

$x = \pm 3\sqrt{2}$

27. $\frac{2x^2}{2} + \frac{8x}{2} = \frac{13}{2}$

$x^2 + 4x + \underline{4} = \frac{13}{2} + \underline{4}$ $\left(\frac{b}{2}\right)^2 = \left(\frac{4}{2}\right)^2 = 4$

$(x+2)^2 = \frac{21}{2}$ $\frac{13}{2} + \frac{8}{2}$

$x + 2 = \pm\sqrt{\frac{21}{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$x + 2 = \pm\frac{\sqrt{42}}{2}$

$x = -2 \pm \frac{\sqrt{42}}{2}$ or $x = \frac{-4 \pm \sqrt{42}}{2}$ If d.d Quadratic Formula

28. $x^2 + 3x = 28$

$x^2 + 3x - 28 = 0$

$(x+7)(x-4) = 0$

$x = -7, 4$

It's factorable, so factor!! ☺

Write the equation in vertex form. Then, find the vertex.

29. $y = 2x^2 - 8x + 15$

$y = 2(x^2 - 4x + \_\_ - \_\_ + \frac{15}{2})$

$y = 2(x^2 - 4x + 4 - 4 + \frac{15}{2})$

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

$y = 2(x-2)^2 + 7$

$V(2, 7)$

30. $y = x^2 + 12x + 16$

$y = x^2 + 12x + \underline{36} - \underline{36} + 16$

$y = (x+6)^2 - 20$

$V(-6, -20)$

Part VI. Applications

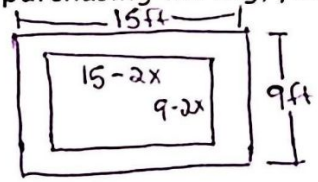
31. A tennis ball is thrown upward with an initial velocity of 8 feet per second. The height of the tennis ball h(t) in terms of the time t since the tennis ball was released is $h(t) = 8t - 16t^2$. How long after the ball is released does it reach the ground? Show your work.

$0 = 8t - 16t^2$

$0 = 8t(1 - 2t)$

$t = 0$, $\frac{1}{2}$ seconds

32. International auction houses sell hundreds of oriental rugs each year to collectors from all over the world. A 17th-century Mughal carpet was recently purchased from a museum for $253,000, despite having moth damage, corrosion, and holes. The rug has a border of uniform width depicting lilies, asters, and roses and a red center called a raspberry field. The rug is 9 ft by 15 ft, with a raspberry field of 91 square feet. If you were interested in purchasing the rug, you might want to know how wide that beautiful border is. How wide is it?



$(15-2x)(9-2x) = 91$

$135 - 30x - 18x + 4x^2 = 91$

$4x^2 - 48x + 135 = 91$

$4x^2 - 48x + 44 = 0$

$4(x^2 - 12x + 11) = 0$

$4(x-11)(x-1) = 0$

$x = 11, 1$ But 11 is > one side

$x = 1$ ft

33. A rectangular prism has length three more than twice the width, x. If the volume of the prism is $6x^3 + 7x^2 - 3x$, what is the height of the prism in terms of x?

$V = l \cdot w \cdot h$

$6x^3 + 7x^2 - 3x = (2x+3) \cdot x \cdot \text{height}$

$x(6x^2 + 7x - 3) = x(2x+3) \cdot \text{height}$

$x(6x^2 + 9x - 2x - 3) = x(2x+3) \cdot \text{height}$

$x(3x(2x+3) - 1(2x+3)) = x(2x+3) \cdot \text{height}$

$x(3x-1)(2x+3) = x(2x+3) \cdot \text{height}$

$\text{height} = 3x - 1$