2009
OCPS ALGEBRA INDIVIDUAL

(1) $\frac{-14x}{15} + \frac{x}{3} = \frac{-14x}{15} + \frac{5x}{15} = \frac{-9x}{15} = \boxed{\frac{-3x}{5}}$

(2) Original cost = \$45 on sale for 30% discount and 6% tax.
Total = $(45)\underbrace{(.70)}_{1-.3}\underbrace{(1.06)}_{1+.06} = \boxed{\$33.39}$

(3) $\frac{x}{a} + \frac{y}{b} = 1$ Multiply by ab: $bx + ay = ab$ ($-bx$, $-bx$) $ay = b(a-x)$
Solve for b $\boxed{b = \frac{ay}{a-x}}$

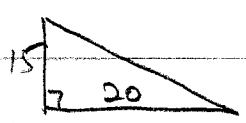
(4) Peanuts = \$7.00/lb
Cashews = \$10.00/lb
Peanut = Cashew + 10
Total Cost = \$410
$7p + 10c = 410$, $p = c + 10$
$7(c+10) + 10c = 410$
$17c + 70 = 410$
$17c = 340$
$c = 20$ so $\boxed{p = 30}$

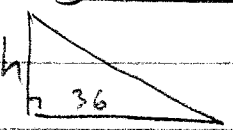
(5) 7th term: $-32, 16, -8, 4, -2, 1, \boxed{-\frac{1}{2}}$ ← 7th term

(6) $y + 6 = -\frac{4}{7}(x+6) \Rightarrow 7y + 42 = -4x - 24$ (-42, -42) $\frac{7y}{7} = \frac{-4x}{7} - \frac{66}{7} \Rightarrow \boxed{y = \frac{-4x}{7} - \frac{66}{7}}$

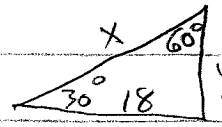
(7) $a \# b = -3a + \frac{1}{2}b$
$(4 \# -2) \# (-4)$
$(4 \# -2) = -3(4) + \frac{1}{2}(-2) = -12 - 1 = -13$
$-13 \# -4 = -3(-13) + \frac{1}{2}(-4) = 39 - 2 = \boxed{37}$

(8) $x + y = 180$, $x = y - 32$
$y - 32 + y = 180$
$2y = 212$
$y = 106$
$\boxed{x = 74}$ ← smaller

(9) 



$\frac{3\cancel{15}}{4\cancel{20}} = \frac{h}{36}$ $\boxed{h = 27 \text{ feet}}$

(10) 

$y = \frac{18}{\sqrt{3}} = \frac{18\sqrt{3}}{3} = 6\sqrt{3}$ $x = 2y = \boxed{12\sqrt{3}}$

(11) $\sqrt{0.121} \approx \boxed{.35}$

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(12) Mean of $\left\{\frac{1}{2}, \frac{1}{8}, \frac{5}{6}, \frac{7}{12}\right\}$ $\Rightarrow$ LCD = 48 $\quad \frac{24}{48} + \frac{6}{48} + \frac{40}{48} + \frac{28}{48} = \frac{98}{48} = \frac{49}{24}$

Mean $= \frac{49}{24} \times \frac{1}{2} = \boxed{\frac{49}{48}}$

(13) $\left(-\frac{1}{8} + \frac{3}{4}x = \frac{1}{16}\right) 16 \Rightarrow -2 + 12x = 1$

$+2 \quad +2$

$12x = 3$ $\rightarrow \boxed{x = 1/4}$

(14) $A = (-6, 4)$, $B = (-2, -2)$ $\quad m = \frac{-2-4}{-2-(-6)} = \frac{-6}{4} = -\frac{3}{2}$; $\quad m_\perp = 2/3$

Midpoint $= (-4, 1)$

Find eqn. of perpendicular bisector

$\left(y = \frac{2}{3}x + \frac{11}{3}\right) 3$

$3y = 2x + 11$

$-3y \quad -11$

$\boxed{2x - 3y = -11}$

$\Leftarrow \begin{cases} y = \frac{2}{3}x + b \\ 1 = \frac{2}{3}(-4) + b \\ 1 = -8/3 + b \Rightarrow b = 1 + \frac{8}{3} = \frac{11}{3} \end{cases}$

(15) $(-9, 2)$, $(3, -10)$ $\quad d = \sqrt{(3-(-9))^2 + (-10-2)^2} = \sqrt{12^2 + 12^2}$

$= \sqrt{288} = \boxed{12\sqrt{2}}$

(16) $\frac{-2}{2-x} = \frac{4}{x-5} \Rightarrow -2x + 10 = 8 - 4x$

$+4x \quad -10 \quad -10 \quad +4x$

$2x = -2$

$\boxed{x = -1}$

(17) $|-2x-3| > 5 \Rightarrow -2x - 3 > 5$ $\quad$ or $\quad -(-2x-3) > 5$

$-2x > 8$ $\quad 2x + 3 > 5$

$x < -4$ $\quad 2x > 2 \Rightarrow x > 1$

$\boxed{x < -4 \text{ or } x > 1}$

(18) $3x + 2y = 7$, $x = \frac{2}{3}y + 5$

$3\left(\frac{2}{3}y + 5\right) + 2y = 7$

$2y + 15 + 2y = 7$

$4y = -8$

$y = -2$

$x = \frac{2}{3}(-2) + 5 = -\frac{4}{3} + \frac{15}{3} = \frac{11}{3}$

$\boxed{\frac{11}{3}, -2}$

(19) $2\text{yd} \times 2\text{ft} \times 2\text{in} = (36\text{in}) \times (24\text{in})(2\text{in}) = \boxed{3456\text{in}^3}$

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(20) $\left(\frac{-3y}{2x^{-2}}\right)^{-3} = \left(\frac{-3x^2y}{2}\right)^{-3} = \left(\frac{2}{-3x^2y}\right)^{-3} = \boxed{\frac{-8}{27x^6y^3}}$

(21) $\sqrt{54} - \sqrt{384} + \sqrt{49}$

$3\sqrt{6} - 8\sqrt{6} + 7 = \boxed{7 - 5\sqrt{6}}$

(22) $\frac{(2-\sqrt{6})(4-\sqrt{6})}{(4+\sqrt{6})(4-\sqrt{6})} = \frac{8-6\sqrt{6}+6}{16-6} = \frac{14-6\sqrt{6}}{10} = \boxed{\frac{7-3\sqrt{6}}{5}}$

(23) $\frac{1}{27} = 9^{x+1} \Rightarrow 3^{-3} = (3^2)^{x+1} \Rightarrow 3^{-3} = 3^{2x+2}$

$-3 = 2x+2 \Rightarrow 2x = -5 \Rightarrow \boxed{x = -5/2}$

(24) $2^{-4}(2^6 \div 2^3 - 2^0 \times (-2))$

$\frac{1}{16}(2^3 - -2) = \frac{1}{16}(8+2) = \frac{10}{16} = \boxed{5/8}$

(25) % decrease 300 to 275 $\Rightarrow \frac{25}{300} = 0.08\overline{3} = 8.\overline{3}\% = \boxed{8\frac{1}{3}\%}$

(26) $y(6y+1) = 2$

$6y^2 + y - 2 = 0$

$(3y+2)(2y-1) = 0$

$\boxed{y = -2/3, 1/2}$

(27) $12y^2 + 13y - 25 = 10$

$-10 \quad -10$

$12y^2 + 13y - 35 = 0$

$(3y-7)(4y+5) = 0$

$\boxed{y = 7/3, -5/4}$

(28) discriminant of $y = 8x^2 - 7x - 2 \Rightarrow = b^2 - 4ac$

$= (-7)^2 - 4(8)(-2) = 49 + 64 = \boxed{113}$

(29) $-9x^4 - 42x^3 + 72x^2$

$-3x^2(3x^2 + 14x - 24)$

$\boxed{-3x^2(3x-4)(x+6)}$

(30) $\frac{3}{4}x^2 - \frac{27}{256} = \frac{3}{4}\left(x^2 - \frac{9}{64}\right) = \boxed{\frac{3}{4}\left(x+\frac{3}{8}\right)\left(x-\frac{3}{8}\right)}$

(31) 0.4% of $0.8 = (.004)(0.8) = \boxed{.0032}$

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(32) What % of 3.1 is 20?

$3.1x = 20 \Rightarrow x = 20/3.1 \approx 6.45 \Rightarrow$ **645%**

(33) 300% of what number is 51?

$3x = 51 \Rightarrow x = 51/3 =$ **17**

(34) $\frac{10!}{5!5!} = \frac{10^2 \cdot 9 \cdot \cancel{8} \cdot 7 \cdot \cancel{6} \cdot \cancel{5!}}{\cancel{8} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot 1 \cdot \cancel{5!}} =$ **252**

(35) $x + 5y + 14 = 0 \Rightarrow 5y = -x - 14 \Rightarrow y = -\frac{1}{5}x - \frac{14}{5}$

through $(6, -4) \Rightarrow$ **$y + 4 = -\frac{1}{5}(x - 6)$**

(36) vertex of $y = 3x^2 - 6x - 2 \Rightarrow x = -\frac{b}{2a} = -\frac{-6}{2(3)} = 1$

$y = 3(1)^2 - 6(1) - 2 = -5$ } **1, −5**

(37) axis of symmetry $y = -\frac{1}{2}x^2 + \frac{3}{5}x - \frac{1}{3}$ } $x = -\frac{b}{2a} = -\frac{3/5}{2(-1/2)} = \frac{3}{5}$.

$x = 3/5$

(38) $3p^3 - 3p^2 - 12p + 12$

$3p^2(p-1) - 12(p-1)$

$(3p^2 - 12)(p-1)$

$3(p^2 - 4)(p-1)$

$3(p+2)(p-2)(p-1)$

(39) $\frac{3y}{4y-8} \div \frac{12y^2}{20-5y^2} = \frac{3y}{4(y-2)} \div \frac{12y^2}{-5(y^2-4)} = \frac{\cancel{3y}}{4\cancel{(y-2)}} \cdot \frac{-5(y+2)\cancel{(y-2)}}{4\cancel{2}y^{\cancel{2}}}$

$= \boxed{\frac{-5(y+2)}{16y}}$

(40) $h = \frac{r}{t}(p - m)$ } Multiply by $\frac{t}{r}$: $\frac{ht}{r} = p - m$

Solve for p: } Add m: $p = \frac{ht}{r} + m$

Get common denominator: **$p = \frac{ht + mr}{r}$**