

2009 Prealgebra - Individual

① Bike = 176 } Needs 176 - 49 = \$127 } $\frac{127}{12} \approx 10.6$ need to mow 11 yards
 Saved \$49 } gets \$12/mowing }

② $5[(46-14) \div 4]$
 $5[32 \div 4] = 5[8] = \boxed{40}$

③ $x=14$ } $(25-x) + \frac{4yz}{2} = (25-14) + \frac{4(5)(6)}{2} = 11 + 60 = \boxed{71}$
 $y=5$ }
 $z=6$ }

④ $x=-1, y=19: |x| - |y| = |-1| - |19| = 1 - 19 = \boxed{-18}$

⑤ $\frac{n}{6} - 8 = -14 \Rightarrow \frac{n}{6} = -6 \Rightarrow \boxed{n = -36}$

⑥ $5n - 20 = 245 \Rightarrow \frac{5n}{5} = \frac{265}{5} \Rightarrow \boxed{n = 53}$

⑦ $120 \xrightarrow{-20} 60 \xrightarrow{-30} 30 \xrightarrow{-15} 15 \xrightarrow{-5} 10 : 120 = \boxed{2^3 \cdot 3 \cdot 5}$

⑧ $\frac{372 \div 4}{996 \div 4} = \frac{93 \div 3}{249 \div 3} = \boxed{\frac{31}{83}}$

⑨ $1\frac{1}{3} \times 1\frac{5}{8} = \frac{4}{3} \times \frac{13}{8} = \frac{13}{6} = \boxed{2\frac{1}{6}}$

⑩ $5\frac{1}{2} \div 3 = \frac{11}{2} \div 3 = \frac{11}{2} \times \frac{1}{3} = \frac{11}{6} = \boxed{1\frac{5}{6}}$

⑪ $\frac{1\frac{1}{4}}{2} = \frac{x}{6} \frac{\text{beef}}{\text{chili}} \Rightarrow \frac{5}{2} \cdot 6 = 2x \Rightarrow 2x = \frac{15}{2} \Rightarrow x = \frac{15}{4} = \boxed{3\frac{3}{4}}$

⑫ $\frac{1}{8} = \frac{3}{5} + k \Rightarrow k = \frac{1}{8} - \frac{3}{5} = \frac{5}{40} - \frac{24}{40} = \boxed{-\frac{19}{40}}$

⑬ $-3, 9, -27, 81, \dots (x-3) \Rightarrow -243, 729, \boxed{-2187}$

⑭ $\frac{80 \text{ cm}}{\text{sec}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{60 \text{ sec}}{1 \text{ min}} = \frac{4800}{100} = \boxed{48 \text{ m/min}}$

⑮ $\frac{4 \text{ in}}{448 \text{ mi}} = \frac{1 \text{ in}}{x \text{ mi}} \Rightarrow x = \frac{448}{4} = \boxed{112 \text{ mi}}$

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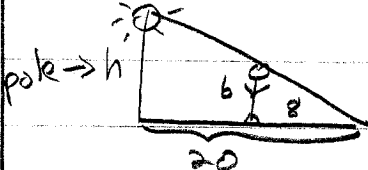
16) 15% discount } $(39.95)(.85) = \boxed{\$33.96}$
 $\$39.95$ } $\underbrace{1-.15}$

17) $-5.6 \geq (-\frac{t}{5}) - 5 \Rightarrow -30 \leq t \Rightarrow \boxed{t \geq -30}$

18) $x + 2y = 10 \Rightarrow$ x-int (y=0) $x = 10$ y-int (x=0) $y = 5$ $\boxed{10, 5}$

19) $(7, -5)$ } $m = \frac{8 - (-5)}{-1 - 7} = \frac{13}{-8} = \boxed{-\frac{13}{8}}$
 $(-1, 8)$ }

20) $(-9, 3)$ } $d = \sqrt{(-1 - (-9))^2 + (7 - 3)^2} = \sqrt{8^2 + 4^2} = \sqrt{64 + 16} = \sqrt{80}$
 $(-1, 7)$ } $\approx \boxed{8.9}$

21)  $\frac{h}{20} = \frac{6}{8} \Rightarrow 4h = 60$
 $\boxed{h = 15 \text{ feet}}$

22) $m\angle V + m\angle W = 90^\circ \Rightarrow x + 2 + (x - 6) = 90 \rightarrow x = 47$
 $2x - 4 = 90 \Rightarrow 2x = 94$ $\boxed{\text{angles} = 49, 41}$

23) $SA = 2\pi r^2 + 2\pi rh$ } $2\pi(14)^2 + 2\pi(14)(8.8)$
 $d = 28, \text{ so } r = 14$ $h = 8.8$ } $392\pi + 246.4\pi = 638.4\pi \approx \boxed{2005 \text{ yd}^2}$

24) 18 numbers, so median = mean of 9th + 10th numbers (in order)
 Median = $\frac{76 + 80}{2} = \frac{156}{2} = \boxed{78}$

25) borrow 4 tapes from 25 total $\Rightarrow {}_{25}C_4 = \frac{{}_{25}P_4}{4!} = \frac{(25)(24)(23)(22)}{(4)(3)(2)(1)} = \boxed{12650}$

26) 6 blue, 7 black, 4 orange, 3 green } $P(\text{blue, orange, green}) = \frac{36}{10} \cdot \frac{14}{20} \cdot \frac{3}{20} = \frac{9}{1000}$
 total = 20 \Rightarrow pick + replace }

27) 8-sided die \Rightarrow Odds of not 2, 5, 8 \Rightarrow 5 not, 3 are so $\boxed{5:3}$

28) $(6c^3 + 8c^2 + 7) - (3c^3 + 6c - 7) = \boxed{3c^3 + 8c^2 - 6c + 14}$

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(29) Sum of mean + median: 30, 32, 32, 38, 40, 41, 44, 48, 50

↑
Median

$$\text{Mean} = \frac{355}{9} \approx 39.4$$

$$\text{Sum} = 40 + 39.4 = 79.4$$

(30) $6(d+6) = 4(d-6) + 2d$

$$6d + 36 = 4d - 24 + 2d$$

$$6d + 36 = 6d - 24$$

$$\begin{array}{r} 6d + 36 = 6d - 24 \\ -6d \quad -6d \end{array}$$

$$36 = -24 \Rightarrow \text{no solution } (\emptyset, \text{empty set})$$

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①
$$L = \frac{(-4)^3 - 42}{-2^2 + (-3)^2} = \frac{-64 - 42}{-4 + 9} = \frac{-106}{5} = -21.2$$

$$M = -17 - 2(-6) + 12 = -17 + 12 + 12 = 7$$

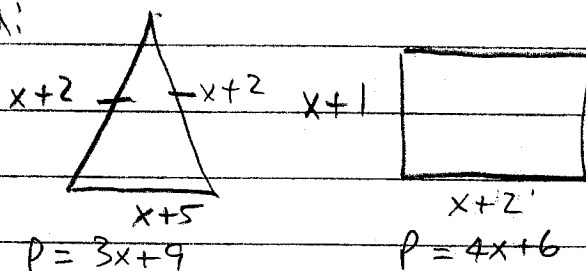
$$LM = (-21.2)(7) = -148.4$$

② level = 70 inches; pump until 14 inches left \Rightarrow pump 56" out
 pumps 7"/hr so $N = 56/7 = 8$ hours

Alicia rode 17 miles } $17 = 3P - 7$ } $P = 8$
 P = Spencer's distance } $\xrightarrow{+7}$ } $24 = 3P$

$$N - P = 8 - 8 = 0$$

③ Perimeters equal:

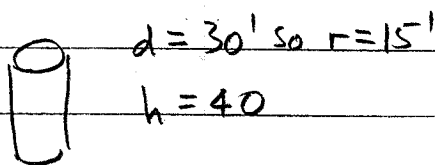
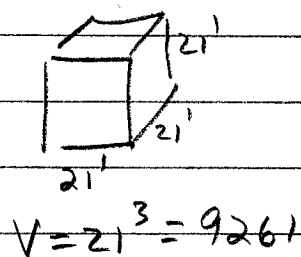


$$\begin{aligned} 3x + 9 &= 4x + 6 \\ -3x - 6 & \quad -3x - 6 \\ \hline 3 &= x \end{aligned}$$

so $P = 3(3) + 9 = 18$

④ $(1.34 \times 10^{-2}) \div (8 \times 10^{-3}) = .1675 \times 10 = 1.675$
 OR $.0134 \div .008 \rightarrow$

⑤



positive diff = $28260 - 9261 = 18999$

⑥ $6(x+8) = 5(x-4)$
 $6x + 48 = 5x - 20$
 $\quad -48 \quad -5x$

 $x = -68$

$2(y+4) = 8 - 6(y-4)$
 $2y + 8 = 8 - 6y + 24$
 $\quad +6y \quad -8 \quad -8 + 6y$

 $8y = 24$
 $y = 3$

$xy = (-68)(3) = -204$

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⑦

$$A = 2\frac{1}{5} \div 5\frac{1}{2} = \frac{11}{5} \div \frac{11}{2} = \frac{11}{5} \cdot \frac{2}{11} = \frac{2}{5}$$

$$B = 7\frac{1}{2} \times 9\frac{1}{2} = \frac{15}{2} \times \frac{19}{2} = \frac{285}{4}$$

$$A+B = \frac{2}{5} + \frac{285}{4} = \frac{8}{20} + \frac{1425}{20} = \frac{1433}{20} = 71\frac{13}{20}$$

⑧

3 blue } Pick 3 marbles:
4 red }
5 green }

$$P(\text{all red}) = \frac{4}{12} \cdot \frac{3}{11} \cdot \frac{2}{10} = \frac{1}{55}$$

⑨

{ 15 20 20 26 31 32 } Mode = 20 Range = 32 - 15 = 17
Med = 23 Mean = $\frac{144}{6} = 24$

$$\frac{\text{Mode} - \text{Range}}{\text{Mean} - \text{Median}} = \frac{20 - 17}{24 - 23} = \frac{3}{1} = 3$$

⑩

E = $1\frac{4}{5}, 1.4, 1, \dots \rightarrow 1.8, 1.4, 1, \dots$ next = $0.6 = \frac{6}{10}$
(subtract 0.4)

F = $3, -\frac{9}{2}, 6\frac{3}{4} \rightarrow 3, -\frac{9}{2}, \frac{27}{4}, \dots$ next = $-\frac{81}{8}$
(multi. by $-\frac{3}{2}$)

$$\frac{6}{10} + \frac{81}{8} = \frac{24}{40} + \frac{405}{40} = \frac{-381}{40} = -9\frac{21}{40}$$

⑪

A = GCF of 72 and 120 $\Rightarrow 72 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$ GCF = 24
 $120 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5$

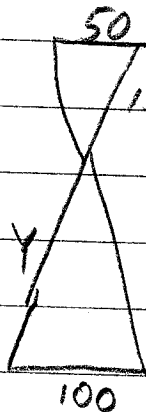
B = LCM of (6, 10, 2)

6 = 2 · 3 } LCM = 2 · 3 · 5 · 7
10 = 2 · 5 } = 210
21 = 3 · 7 }

$$\frac{A}{B} = \frac{24}{210} = \frac{2 \cdot 2 \cdot 2 \cdot 3}{2 \cdot 3 \cdot 5 \cdot 7} = \frac{4}{35}$$

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12



$$\frac{150}{3+150} = \frac{100}{Y}$$

$$Y = 300$$

$$\frac{\text{tree } 25 \text{ feet}}{\text{shadow } 40 \text{ feet}} = \frac{Z}{30 \text{ feet}}$$

$$Z = 18.75$$

$$8Z = 150$$

$$\frac{Y}{Z} = \frac{300}{18.75} = \boxed{16}$$

13

\$21000 with 15% discount and 7 1/4% sales tax

$$\text{Cost} = (21000)(0.85)(1.0725) = \boxed{\$19144.13}$$

1-15% 1+7 1/4%

accept \$19144.12

14

$$3x - 4y = 7$$

$$-3x$$

$$\frac{-4y = -3x + 7}{-4} \quad \frac{-3x}{-4} \quad \frac{7}{-4}$$



$$y = \frac{3}{4}x - \frac{7}{4}$$

$$m+b = \frac{3}{4} + \frac{-7}{4} = \frac{-4}{4}$$

$$= \boxed{-1}$$

15

$$C = 3\frac{1}{4} - \left(\frac{3}{4}\right) = \frac{13}{4} + \frac{3}{4} = \frac{16}{4} = 4$$

$$D = 4\frac{9}{10} + 1\frac{1}{10} = 5\frac{10}{10} = 6$$

$$C \div D = \frac{4}{6} = \boxed{\frac{2}{3}}$$