

## 2009 Glencoe - Individual

- ①  $2720 \text{ mL} = 2.72 \text{ L}$   
 $24.91 \text{ L} = 24.91 \text{ L}$   
 $0.0268 \text{ kL} = 26.8 \text{ L}$  } least to greatest  
2720 mL, 24.91 L, 0.0268 kL
- ②  $w = 4.5$   
 $x = 0.6$   
 $p = 1.5$  }  $\frac{wx}{p} + \frac{p}{x} = \frac{(4.5)(0.6)}{1.5} + \frac{1.5}{0.6} = 1.8 + 2.5 = \boxed{4.3}$
- ③  $\frac{n+4}{5} = 8 \Rightarrow n+4 = 40$   
n = 36
- ④  $-2z + 5 \leq 35$   
 $\quad \quad \quad -5 \quad -5 \Rightarrow \frac{-2z}{-2} \leq \frac{30}{-2} \Rightarrow \boxed{z \geq 15}$
- ⑤  $a = -5$   $c = -4$   
 $b = -2$  }  $(c-b)^2 + a^2 = (-4 - (-2))^2 + (-5)^2$   
 $= (-2)^2 + (-5)^2 = 4 + 25 = \boxed{29}$
- ⑥ between 850 and 900 } Possible: 851, 861, 871, 881, 891  
 divisible by 9, units digit = 1 } only 861, 891 have sum of digits = 9  
891 only option
- ⑦  $a = 2$   $b = 3$   
 $x = 5$   $y = 4$  }  $\frac{x^2 - y}{a + 2b} = \frac{5^2 - 4}{2 + 2(3)} = \frac{25 - 4}{2 + 6} = \frac{21}{8} = \boxed{2\frac{5}{8}}$
- ⑧  $\frac{1}{6} + \frac{3}{8} + \frac{3}{4} = \frac{4}{24} + \frac{9}{24} + \frac{18}{24} = \frac{31}{24} = \boxed{\frac{7}{8}}$
- ⑨  $l = \frac{2}{11}$   
 $w = \frac{1}{4}$  }  $P = 2l + 2w = 4/11 + 1/2 = 8/22 + 11/22 = \boxed{\frac{19}{22}}$
- ⑩  $a = 4\frac{1}{5}$   
 $b = 2\frac{7}{20}$   
 $c = 3\frac{1}{4}$  }  $a - b + c = 4\frac{1}{5} - 2\frac{7}{20} + 3\frac{1}{4}$   
 $= 4\frac{4}{20} - 2\frac{7}{20} + 3\frac{5}{20}$   
 $\swarrow \quad \nwarrow$   
 $7\frac{9}{20} - 2\frac{7}{20} = 5\frac{2}{20} = \boxed{5\frac{1}{10}}$

2009 Glencoe - INDIVIDUAL

⑪  $\left. \begin{array}{l} x = \text{trumpet} \\ y = \text{trombone} \\ z = \text{tuba} \end{array} \right\} \begin{array}{l} 2z = y \\ \frac{1}{2}x = y \\ y = z + 2 \end{array} \rightarrow \begin{array}{l} 2z = z + 2 \Rightarrow z = 2 \\ y = 2 + 2 = 4 \\ x = 2y = 8 \end{array} \left. \vphantom{\begin{array}{l} x = \text{trumpet} \\ y = \text{trombone} \\ z = \text{tuba} \end{array}} \right\} \boxed{x + y + z = 14}$

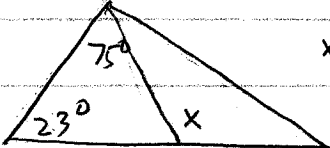
⑫  $\left. \begin{array}{l} \frac{3}{7} = \text{blue} \\ \frac{1}{6} = \text{red} \end{array} \right\} \frac{3}{7} + \frac{1}{6} = \frac{18}{42} + \frac{7}{42} = \frac{25}{42} \Rightarrow \text{so } \frac{17}{42} \text{ do not like either}$   
 $\left( \frac{17}{42} \right) (1092) = \boxed{442}$

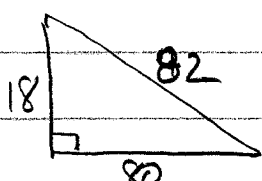
⑬  $\left. \begin{array}{l} ABCDE \sim FGHIJ \\ GH = 12, IJ = 15 \\ DE = 10 \end{array} \right\} \frac{BC}{DE} = \frac{GH}{IJ} \left. \vphantom{\begin{array}{l} ABCDE \sim FGHIJ \\ GH = 12, IJ = 15 \\ DE = 10 \end{array}} \right\} \frac{BC}{10} = \frac{12}{15} \cdot \frac{4}{5} \quad \boxed{BC = 8}$

⑭  $0.8\% \text{ of } 75000 = (.008)(75000) = \boxed{600}$

⑮  $\left. \begin{array}{l} 25\% \text{ are SUVs} \\ 10\% \text{ are trucks} \end{array} \right\} \text{so } 65\% \text{ are neither}$   
 $65\% \text{ of } 5 \text{ million} = (.65)(5) = 3.25 \text{ million}$   
 $\boxed{3,250,000}$

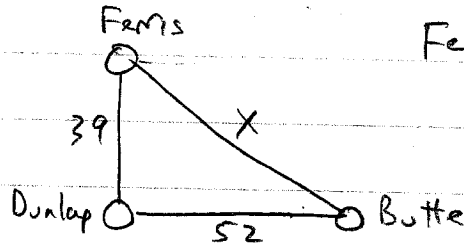
⑯  $\left. \begin{array}{l} \$18.50 \\ 0.5\% \text{ city tax} \\ 4\% \text{ sales tax} \end{array} \right\} \begin{array}{l} \text{City tax} = (.005)(18.50) = 0.0925 \\ \text{State tax} = (.04)(18.50) = 0.7400 \\ \text{difference} = .74 - .0925 = .6475 \sim \boxed{\$0.65} \end{array}$

⑰   $x = \text{exterior angle} = 23 + 75 = \boxed{98^\circ}$

⑱   $A = \frac{1}{2}(18)(80) = \boxed{720 \text{ cm}^2}$

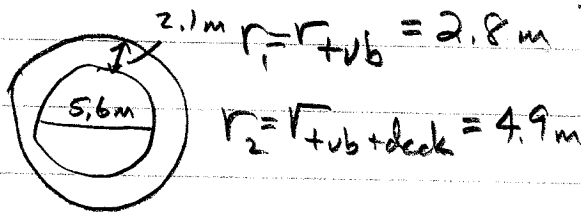
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19



Ferris to Dunlap to Butte =  $39 + 52 = 91$  mi  
 $x^2 = 39^2 + 52^2 = 1521 + 2704 = 4225$   
 $x = \sqrt{4225} = 65$  mi  
 difference =  $91 - 65 = 26$  miles

20

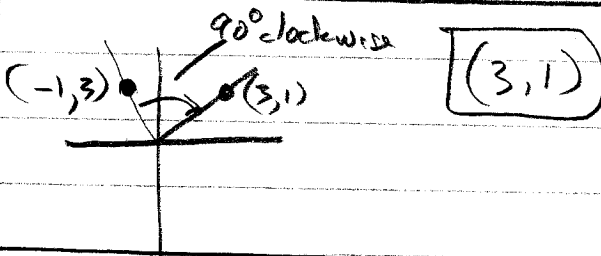


$r_1 = r_{tub} = 2.8$  m  
 $r_2 = r_{tub + deck} = 4.9$  m  
 $A_{deck} = \pi r_2^2 - \pi r_1^2$   
 $= \pi(4.9)^2 - \pi(2.8)^2$   
 $= 24.01\pi - 7.84\pi = 16.17\pi$

21

% interviews =  $\frac{22}{48} = \frac{11}{24} = .458\bar{3} \approx 46\%$

22



23

$\frac{1 \text{ cm}}{6.5 \text{ m}} = \frac{1.9 \text{ cm}}{x \text{ m}} \Rightarrow x = (6.5)(1.9) = 12.35 \text{ m}$

24

6 sided dice tossed "x" times  $\Rightarrow$  number of possibilities =  $6^x$

25

24 marbles }  $x =$  number of red  
 $P(\text{red}) = 2 P(\text{red})$  } so  $x = 2(24 - x)$   
 $x = 48 - 2x$   
 $+2x \quad +2x$   
 $3x = 48$   
 $x = 16$  red

26

numbers 2 to 14  
 prime = 2, 3, 5, 7, 11, 13 - 6 numbers  
 not prime = 4, 6, 8, 9, 10, 12, 14 - 7 numbers  
 Odds against picking prime = 7 to 6

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(27) 
$$\frac{\text{ratio of wins}}{\text{games played}} = \frac{2}{9} = \frac{x}{45} \Rightarrow \boxed{x = 10 \text{ wins}}$$

(28) \$3.20 per day but \$1.00 rebate if returned before 5 days  

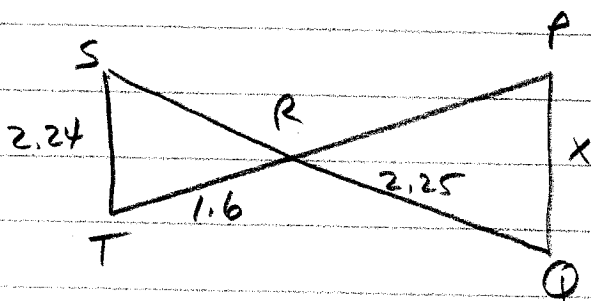
$$\text{if } d \leq 5, C = 3.20d - 1 \quad \text{if } d > 5, C = 3.20d$$

(29)

Soda	A	B	C	D	E	
# Preferred	10	15	9	11	7	total = 52

$$P(\text{neither A nor B}) = \frac{27}{52}$$

(30)  $\triangle PQR \sim \triangle STR$



$$\frac{ST}{PQ} = \frac{TR}{QR}$$

$$\frac{2.24}{x} = \frac{1.6}{2.25}$$

$$1.6x = (2.24)(2.25)$$

$$1.6x = 5.04$$

$$\boxed{x = 3.15 \text{ km}}$$

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(1) 
$$\begin{aligned} A - 2B &= C \\ C - B &= 3A \end{aligned} \left. \begin{array}{l} \text{substitute } C: \\ \end{array} \right\} \begin{aligned} A - 2B - B &= 3A \Rightarrow -3B = 2A \\ C &= B + 3A \end{aligned}$$

$A = -\frac{3}{2}B$

$= B + 3(-\frac{3}{2}B) = -\frac{7}{2}B = C$

$A + 7B + 2C = 3$

$-\frac{3}{2}B + 7B + 2(-\frac{7}{2}B) = 3 \Rightarrow -\frac{3}{2}B + 7B - 7B = 3 \Rightarrow B = -2$

so  $A = -\frac{3}{2}(-2) = 3$       $C = 3 - 2(-2) = 7$

$A + B - C = 3 + (-2) - 7 = \boxed{-6}$

(2) 
$$\left. \begin{array}{l} 100 \text{ cm} = 1 \text{ m} \\ 10000 \text{ cm}^2 = 1 \text{ m}^2 \end{array} \right\} \frac{1}{8} \text{ m}^2 \times \frac{10000 \text{ cm}^2}{\text{m}^2} = 1250 \text{ cm}^2$$

$$\left. \begin{array}{l} 12 \text{ in} = 1 \text{ ft} \\ 144 \text{ in}^2 = 1 \text{ ft}^2 \end{array} \right\} \frac{1}{8} \text{ ft}^2 \times \frac{144 \text{ in}^2}{\text{ft}^2} = 18$$

$C - D = 1250 - 18 = \boxed{1232}$

(3) + (4)

Stem	leaf	18 numbers
5	1 3 5 9	Median = $\frac{9^{\text{th}} + 10^{\text{th}}}{2} = \frac{7.6 + 8.0}{2}$
6	1 6 9	$= \frac{15.6}{2} = 7.8$
7	4 6	Q1 = 5th number = 6.1
8	0 1 2 4 9	Q3 = 14th number = 8.9
9	2 2 3 3	Mean = $\frac{\text{sum}}{18} = \frac{135.0}{18} = 7.5$

$9 | 2 = 9.2$

(3) (Mean)(Median) = (7.5)(7.8) =  $\boxed{58.5}$

(4) Q3 - Q1 = 8.9 - 6.1 =  $\boxed{2.8}$

(5) 
$$\begin{aligned} A &= 7\frac{3}{4} - 1\frac{5}{6} & B &= 5\frac{1}{2} + 3\frac{3}{8} & AB &= 5\frac{11}{12} \div 8\frac{7}{8} \\ &= \frac{6\frac{9}{12} - 1\frac{10}{12}}{1} & &= 5\frac{4}{8} + 3\frac{3}{8} & &= \frac{71}{12} \div \frac{71}{8} = \frac{71}{12} \times \frac{8}{71} \\ &= 5\frac{11}{12} & &= 8\frac{7}{8} & &= \frac{2}{3} \end{aligned}$$

$= \boxed{\frac{2}{3}}$

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⑥  $x = -3$   $C = -\left(\frac{x}{y}\right)^3 = -\left(\frac{-3}{2}\right)^3 = -\left(\frac{-27}{8}\right) = \frac{27}{8}$   
 $y = 2$   $D = \frac{(x+y)^2}{(x-y)^2} = \frac{(-3+2)^2}{(-3-2)^2} = \frac{(-1)^2}{(-5)^2} = \frac{1}{25}$   
 $C+D = \frac{27}{8} + \frac{1}{25} = \frac{675}{200} + \frac{8}{200} = \boxed{\frac{683}{200}}$

⑦  $E = 7 - (-5) - 8 = 7 + 5 - 8 = 4$  }  $EF = 4(-0.1) = -0.4$   
 $F = -1.3 + 7.2 + (-6) = -7.3 + 7.2 = -0.1$  }  
 $G = (0.75)(0.68) = 0.51$  }  $GH = (0.51)(30) = 15.3$   
 $H = -5.7 \div (0.19) = 30$  }  
 $EF - GH = -0.4 - 15.3 = \boxed{-15.7}$

⑧  $\left(\frac{1}{3}(x - \frac{7}{2}) = 1\right) 3$   $\left(-\frac{1}{4}(y+4) = 1\right) -4$   
 $(x - \frac{7}{2} = 3) 2$   $y + 4 = -4$   
 $2x - 7 = 6$   $y = -8$   $xy = \frac{13}{2}(-8) = \boxed{-52}$   
 $2x = 13 \rightarrow x = 13/2$

⑨  $10x = 1.1\overline{6}$   $10x = 4.6\overline{6}$   $0.11\overline{6} + 0.4\overline{6}$   
 $-x = 0.11\overline{6}$   $x = 0.4\overline{6}$   $\frac{7}{60} + \frac{7}{15}$   
 $9x = 1.05$   $9x = 4.2$   $\frac{7}{60} + \frac{28}{60} = \frac{35}{60} = \boxed{\frac{7}{12}}$   
 $x = \frac{105}{900} = \frac{7}{60}$   $x = \frac{42}{90} = \frac{7}{15}$

⑩  $P\% \text{ of } 5 = 16$   $Q = .27(1520)$   $17\% \text{ of } R \text{ is } 5.1$   
 $\frac{P}{100} = \frac{16}{5}$   $= 405$   $\frac{17}{100} = \frac{5.1}{R} \Rightarrow 17R = 510$   
 $P = 320$   $R = 30$

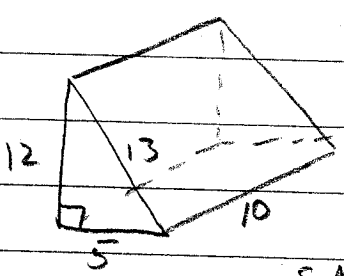
$P - Q + R = 320 - 405 + 30 = \boxed{-55}$

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(11)  $R = \% \text{ increase } 40 \text{ to } 46.8 = \frac{6.8}{40} = .17 = 17\% \Rightarrow R = 17$   
 $S = \% \text{ decrease } 52 \text{ to } 36.4 = \frac{15.6}{52} = .3 = 30\% \Rightarrow S = 30$   
 $R + S = 17 + 30 = \boxed{47}$

(12) 
$$\begin{array}{r} 3x + 6y = 4 \\ -3x \quad \quad -3x \\ \hline 6y = -3x + 4 \end{array}$$
  
 $y = -\frac{1}{2}x + \frac{2}{3}$        $m \div b = -\frac{1}{2} \div \frac{2}{3}$   
 $\frac{6y}{6} = \frac{-3x+4}{6}$        $m = -1/2$      $b = \frac{2}{3}$        $= -\frac{1}{2} \cdot \frac{3}{2} = \boxed{\frac{-3}{4}}$

(13)  $4' 3'' = 4 \frac{3}{12}' = 4.25'$        $\frac{T}{18} = \frac{4.25}{3}$        $T = 25.5 \text{ feet}$

(14)   
 $V = Bh = \frac{1}{2}(5)(12)(10) = 300$   
 $SA = 2B + LA = 2B + ph$   
 $= 2(\frac{1}{2})(5)(12) + (5+12+13)(10)$   
 $= 60 + 300 = 360$   
 $SA/V = 360/300 = \boxed{1.2}$

(15) 3 red  
 4 blue  
 5 white  
 2 black  
 1 orange  
 16 total

$P = P(\text{red or white}) = \frac{8}{16} = \frac{1}{2}$   
 $Q = P(2 \text{ marbles; } 1 \text{ black} + 1 \text{ blue}) = \frac{2}{16} \cdot \frac{4}{15} = \frac{1}{30}$   
 $P + Q = \frac{1}{2} + \frac{1}{30} = \frac{15}{30} + \frac{1}{30} = \frac{16}{30} = \boxed{\frac{8}{15}}$