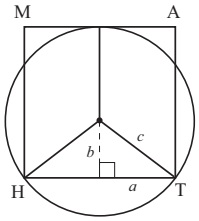
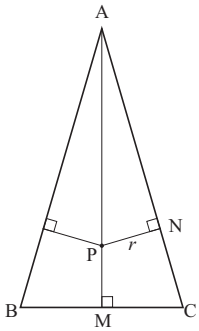
1. (E) $f(2) = f(3-1) = 3^2 + 1$
2. (A) $223^\circ - 180^\circ = 43^\circ \Rightarrow 40/10 = 4$
3. (B) $4^3 + 6^3 + 12^3 = 2008$
4. (E) Factors of 16: $(\pm1, \pm16)$, $(\pm2, \pm8)$, $(\pm4, \pm4)$; b could be the sum of any of these.
5. (D) $f(x) - f(2y) = x^2 - 2x + 4 - 4y^2 + 4y - 4 = x^2 - 2x - 4y^2 + 4y = x^2 + 2xy - 2x - 2xy - 4y^2 + 4y = x(x+2y-2) - 2y(x+2y-2) = (x-2y)(x+2y-2)$
6. (E) Draw three radii as shown in the figure and create the right triangle with sides a, b, and c. If the side of the square is x, $a = x/2$, $b = x - 20$, and $c = 20$. Use Pythagorean formula and solve for x.



Problem 6

7. (E) Number of outcomes from three coin flips: $2^3 = 8$, number of ways to get two A's and one M: $3 \Rightarrow P(\text{AMA}) = 3/8$. Number of unique outcomes from the die: $3^3 = 27$, number of ways to get one T, one Y, and one C: $3! = 6$. $\Rightarrow P(\text{TYC}) = 6/27$. $P(\text{AMA}) \cap \text{P(TYC)} = (3/8)(6/27)$.
8. (C) $(\log_{624} 625)(\log_{623} 624)(\log_{622} 623)\cdots = (\log_{623} 624^{\log_{624} 625})(\log_{622} 623)\cdots$ $= (\log_{623} 625)(\log_{622} 623)\cdots$ Repeat until you have $\log_5 625 = 4$
9. (B) AMATYC written 16 times plus AMAT. There are 34 A's $\Rightarrow \frac{34}{100} \cdot \frac{33}{99} \cdot \frac{32}{98} \approx 0.037$
10. (D) $600 < {}_5C_2 \cdot {}_xC_2 = 10 \cdot \frac{x!}{3!(x-3)!} \Rightarrow x(x-1)(x-2) > 360$. From here trial and error using the answers provided is most efficient.
11. 42. Let D be the distance to work. time = distance/rate: $\dfrac{D/2}{S} + \dfrac{D/2}{S+8} + \dfrac{D}{S+14} = 1.67\left(\dfrac{D}{S}\right)$ $\Rightarrow \dfrac{1}{S+8} + \dfrac{2}{S+14} - \dfrac{2.34}{S} = 0$. solve for S.
12. (C) Can be reduced to 6, 9, 11 lb bags for a total of 500 lbs. Answer: 80 12-lb bags, one 18-lb bag and one 11-lb bag.
13. (C)
14. (B)
15. (D) The pattern is: G G G R G G G R... G G G R G. Three greens for every red with an additional green at the end.
16. (A) $1.5 < b/11 < 1.8 \Rightarrow b \in \{17, 18, 19\}$; $1.5 < c/15 < 1.8 \Rightarrow c \in \{23, 24, 25, 26\}$. Use $1.5b < c < 1.8b$ to determine $b = 17$ and $c = 26$
17. (D)
18. (D) Let r be this distance. From the figure shown, AM $= \sqrt{25^2 - 7^2} = 24$. From similar triangles, $\triangle$APN $\sim \triangle$ABM, $\frac{7}{25} = \frac{x}{24-x} \Rightarrow x = \frac{21}{4}$
19. (E) 361, 529, and 784
20. (C)



Problem 18