

1. A:  $4(3) - 2(-5) = 12 + 10 = \mathbf{22}$   
 B:  $3 + 11(-5) = -\mathbf{52}$   
 C:  $3(3) - (-5) = \mathbf{14}$   
 D:  $9(3) - 4(-5) = \mathbf{47}$
2. A:  $f(g(2)) \Rightarrow f([2 - 2]) = f(0)$   
 $\Rightarrow (0)^2 + 10(0) = \mathbf{0}$   
 B:  $g(f(2)) \Rightarrow g([(2^2 + 10(2))]) = g(24)$   
 $\Rightarrow 24 - 2 = \mathbf{22}$   
 C:  $f(3) \times g(5) \Rightarrow [3^2 + 10(3)] \times [5 - 2] = \mathbf{117}$   
 D:  $f(4) + 100 \times g(5) \Rightarrow [4^2 + 10(4)] + 100 \times [5 - 2] = \mathbf{356}$
3. A: The area of the shaded area is equal to area of the larger circle minus the area of the smaller circle.  $\pi 6^2 - \pi 2^2 = \mathbf{32\pi}$   
 B:  $\pi d = \pi(6 + 6) = \mathbf{12\pi}$   
 C:  $\pi r^2 = \pi 2^2 = \mathbf{4\pi}$   
 D:  $\frac{6+2}{2} = \mathbf{4}$
4. A: The probability of the getting the first spade would be  $\frac{13}{52}$  and the since there is no replacement, the probability of the getting the second spade would be  $\frac{12}{51}$ . To get the probability of getting both of these, we would multiply the results.  
 $\frac{13}{52} \times \frac{12}{51} = \frac{1}{4} \times \frac{4}{17} = \frac{1}{17}$   
 B: There are **four** cards with a 9 on them (spade, heart, club, and diamond).  
 C: From 1 to 8 there are 4 prime numbers (2, 3, 5, and 7). The probability of getting a prime would then be  $\frac{4}{8}$ .  
 D:  $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = \mathbf{36}$
5. A:  $E - 3 = \frac{D}{3}$ . E is Esha's current age and D is her dad's age 3 years ago. Since we know that Esha is currently 17, we can solve for D.  $17 - 3 = \frac{D}{3}$ ;  $D = 42$ . Thus the sum of their current ages is  $17 + [42 + 3] = \mathbf{62}$ .  
 B:  $42 + 3 = \mathbf{45}$   
 C: The average of her and her father's current age is  $\frac{17+45}{2} = 31$ . Since Esha is 17 it will her **14** years to become 31.

D: The difference between ages doesn't change over time. Thus, it can be found by subtracting the current ages.  $45 - 17 = \mathbf{28}$ .

6. A:  $.6(x) + .2(40) = .5(x + 40)$ . The variable,  $x$ , is amount of 60% orange juice solution added.  $.6x + 8 = .5x + 20 \Rightarrow .1x = 12 \Rightarrow x = \mathbf{120 L}$

B: The final volume is equal to the initial amount of cranberry juice solution plus the added orange juice solution.  $40 + 120 = \mathbf{160 L}$

C: Since 60% of the orange juice solution is orange juice, the other 40% is water.  $120(.40) = \mathbf{48 L}$

D:  $120 - 40 = \mathbf{40 L}$

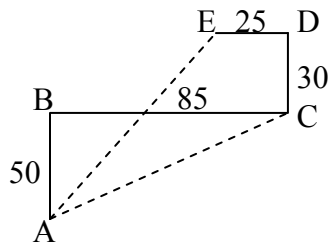
7. A:  $2 \times 3 \times 5 = \mathbf{30}$

B: Sixty has **12** factors [1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60].

C: The product of the Least Common Multiple and the Greatest Common Factor is always just the product of the numbers.  $42 \times 24 = \mathbf{1008}$

D: The products of the prime factors is just the number itself, **56**.

8.



A: The shortest distance between A and E is the hypotenuse of a right triangle with sides of 80 and 60. Thus AE is **100 mi**.

B: There is no travel in the southward direction. **0 mi**.

C:  $-85 + 25 = \mathbf{-60 mi}$

D:  $\frac{50 \times 85}{2} = \mathbf{2125 mi^2}$

9. A: There are **2** sets of parallel edges.

B: A space diagonal is equal to  $s\sqrt{3}$ , where  $s$  is the side length of the cube. So the length is  $3\sqrt{3}$ .

C:  $\frac{5 \times 12}{2} = \mathbf{30}$

D:  $2 \times 8 = \mathbf{16}$

10. A:  $4^{2a} + 31 = 2^5$

$$\Rightarrow 4^{2a} = 1$$

$$\Rightarrow \mathbf{a = 0}$$

B:  $(3 + 2)^4 = 5^2 + b10^2$

$$\Rightarrow 625 = 25 + 100b$$

$$\Rightarrow \mathbf{b = 6}$$

C:  $(-1)^{89} \times 6^{-2} = .5c$

$$\Rightarrow \frac{-1}{36} = \frac{c}{2}$$

$$\Rightarrow \mathbf{c = -\frac{1}{18}}$$

D:  $4(3 \times d) + 10 = 7^2 - d$

$$\Rightarrow 13d = 39$$

$$\Rightarrow \mathbf{d = 3}$$

11. A:  $5 \Delta \nabla 1 = 5^3 - 9(5 - 4) + 1^{-1} = 125 - 9 + 1 = \mathbf{117}$

B:  $6 \Delta \nabla 4 - 3 \Delta \nabla 4 = [6^3 - 9(6 - 4) + 4^{-1}] - [3^3 - 9(3 - 4) + 4^{-1}] = [6^3 - 3^3] + [-9(6 - 4) + 9(3 - 4)] = \mathbf{162}$

C:  $\frac{2 \Delta \nabla 2}{0 \Delta \nabla 4} = \frac{2^3 - 9(2 - 4) + 2^{-1}}{0^3 - 9(0 - 4) + 4^{-1}} = \frac{8 + 18 + \frac{1}{2}}{36 + \frac{1}{4}} = \frac{\mathbf{106}}{\mathbf{145}}$

D:  $9 \Delta \nabla 1 = 9^3 - 9(9 - 4) + 1^{-1} = 729 - 45 + 1 = \mathbf{685}$

12. A: **True**

B: **False**

C: **False** (it increases by a factor of 25).

D: **False**

13. A: **108°**

B: **108°**

C: **132°**

D: **60°**

14. A: The total sales are 600. The percent of book sales is  $\frac{120}{600} = \mathbf{20\%}$

B:  $\frac{240}{600} = \mathbf{40\%}$

C:  $\frac{180}{600} = \mathbf{30\%}$

D:  $\frac{60}{600} = \mathbf{10\%}$

15. A:  $\frac{6!}{2!} = \mathbf{360}$

B:  $3! = \mathbf{6}$

C:  $\frac{7!}{3!} = \mathbf{840}$

D:  $4! = \mathbf{24}$