Answer Key

Section 5-1

1. A 2. B 3. C 4. B 5. 1996
6. 80

Section 5-2

1. C 2. D 3. A 4. D 5. 400
6. 25

Section 5-3

1. B 2. A 3. B 4. D 5. C

Section 5-4

1. B 2. D 3. A 4. 104 5. 14

Chapter 5 Practice Test

1. D 2. C 3. B 4. A 5. A
6. C 7. D 8. B 9. A 10. B

Answers and Explanations

Section 5-1

1. A

Distance traveled
$= \text{speed} \times \text{time} = \frac{60 \text{ miles}}{1 \text{ hour}} \times 5\frac{1}{4} \text{ hours} = 315 \text{ miles}$
Number of gallons of gas used
$= \frac{1 \text{ gallon}}{35 \text{ miles}} \times 315 \text{ miles} = 9 \text{ gallons}$

Since the tank of Chloe's car was filled with 12 gallons of gas at the beginning, $12 - 9$,or 3 gallons of gas are left in the tank.

2. B

Average rate of climbing per hour
$= \frac{\text{height gained}}{\text{time}} = \frac{210 - 90}{11 - 9.5} = \frac{120}{1.5}$
$= 80 \text{ feet / hour}$

By 11:00 AM he has reached 210 feet up the cliff, so, the remaining height is $450 - 210$, or 240 feet. Since he is climbing up 80 feet per hour, it will take him $\frac{240}{80}$, or 3 more hours to reach the top of the cliff. Three hour later from 11:00 am is 2 pm.

3. C

Average rate of change in the price of the house
$= \frac{334,000 - 280,000}{2013 - 2005} = \frac{54,000}{8}$
$= 6,750 / \text{year}$

The purchase price of the house in the year 2018 will be $334,000 + 5 \times 6,750$, or \$367,750.

4. B

Since the first month is free for the club, the amount of monthly fee x months after a person joined the club will be $w \times (x - 1)$, and the total amount including the one time membership fee will be $w \times (x - 1) + d$.

Choice B is the correct.

5. 1996

Average rate of change in the population of city A
$= \frac{28,000 - 12,000}{2000 - 1990} = \frac{16,000}{10}$
$= 1,600 / \text{year}$

Average rate of change in the population of city B
$= \frac{24,000 - 18,000}{2000 - 1990} = \frac{6,000}{10}$
$= 600 / \text{year}$

Let $x =$ the number of years from 1990, and let $y =$ the population after 1990.
The population of city A after 1990 will be $y = 1600x + 12,000$ and the population of city B after 1990 will be $y = 600x + 18,000$.
To find the year the population of both cities were the same, let the two equations be equal.
$1600x + 12,000 = 600x + 18,000$

Solving the equation for x yields $x = 6$.
The correct answer is 1996.

6. 80

Let $x =$ the time in minutes it takes for the amount of water in both tanks to become the same. During x minutes, $6x$ gallons of water filled in the empty tank and $9x$ gallons of water were drained from the 1,200 gallon tank. If the amount of water in the two tanks are the same, $6x = 1200 - 9x$.

Solving the equation for x gives $x = 80$.

Section 5-2

1. C

To find out the time it took for Jason to reach the finish line, solve the equation $-8t+200=0$ for t. Solving the equation for t gives $t=25$. Substitute 25 for t in the expression $-7.5t+200$.

$-7.5(25)+200=12.5$

Therefore, Mary has 12.5 meters left to finish when Jason is on the finish line.

2. D

First 6 bagels cost 55 cents each and the additional bagels cost c cents each. The total for 12 bagels is \$5.70. So, the other 6 bagels cost c cents each.

$6\times 0.55+6c=5.70$

$3.3+6c=5.70$

$6c=2.4$

$c=0.4$

The value of c is 40 cents.

3. A

Buying cost of candies $=0.7c$

Number of candies sold $=c-k$

Selling price $=1.25(c-k)$

Profit = selling price – buying cost

$=1.25(c-k)-0.7c$

4. D

Let $x=$ David's monthly salary, then

$\frac{1}{10}x=$ grocery cost,

$\frac{9}{10}x=$ remaining salary,

$\frac{3}{18}\cdot\frac{9}{10}x=$ car payment,

$2\cdot\frac{3}{18}\cdot\frac{9}{10}x=$ rent.

David's monthly salary x is equal to the sum of his grocery, car payment, rent, and \$1,620.

$$x=\frac{1}{10}x+\frac{3}{18}\cdot\frac{9}{10}x+2\cdot\frac{3}{18}\cdot\frac{9}{10}x+1620$$

$$x=\frac{99}{180}x+1440 \Rightarrow x-\frac{99}{180}x=1620$$

$$\Rightarrow x-\frac{99}{180}x=1440 \Rightarrow \frac{81}{180}x=1620$$

$$\Rightarrow x=1620\cdot\frac{180}{81}=3600$$

5. 400

Let $x=$ the number of votes the winner received, then $x-120=$ the number of votes the loser received. The sum of the votes both the winner and the loser received equals 680.

$x+(x-120)=680$

$2x-120=680$

$2x=800$

$x=400$

6. 25

Let $x=$ the total capacity of the gas tank in liters.

Since $\frac{3}{8}$ of the gas tank is equivalent to 15 liters,

$\frac{3}{8}x=15$.

$\frac{3}{8}x=15 \Rightarrow x=15\cdot\frac{8}{3}=40$

Since the gas tank is $\frac{3}{8}$ full, we need $\frac{5}{8}x$ more liters to fill up the gas tank.

$\frac{5}{8}x=\frac{5}{8}(40)=25$ liters

Section 5-3

1. B

Let $x=$ the amount Betty paid for the printer, then $2x-18=$ the amount Adam paid for the printer. Total amount they paid together is \$258.

$$\underbrace{(2x-18)}_{\text{amount Adam paid}}+\underbrace{x}_{\text{amount Betty paid}}=258$$

$\Rightarrow 3x-18=258 \Rightarrow 3x=276 \Rightarrow x=92$

The amount Adam paid

$=2x-18=2(92)-18=166$

2. A

Let $x=$ the number of two-seat tables, then $28-x=$ the number of four-seat tables. When all the tables are full, there will be 90 customers in the restaurant. Therefore,

$2x+4(28-x)=90$

$\Rightarrow 2x+112-4x=90 \Rightarrow -2x+112=90$

$\Rightarrow -2x=-22 \Rightarrow x=11$

There are 11 two-seat tables.

3. B

Let x = the number of 3-point field goals,
then $x+73$ = the number of 2-point field goals.
He scored a total of 216 goals in the tournament.

$$\underbrace{3x}_{\substack{\text{number of points made}\\ \text{through 3-point field goal}}} + \underbrace{2(x+73)}_{\substack{\text{number of points made}\\ \text{through 2-point field goal}}} = \underbrace{216}_{\substack{\text{total number}\\ \text{of points}}}$$

$3x+2(x+73)=216 \Rightarrow 3x+2x+146=216$
$\Rightarrow 5x+146=216 \Rightarrow 5x=70 \Rightarrow x=14$

4. D

Let x = the original number of sedans.
Then $x-36$ = the number of sedans left after 36 of them are sold and $x+8$ = the number of sedans after 8 are added.
Let y = the original number of SUVs.
Then $y+36$ = the number of SUVs after 36 of them are added and $y-8$ = the number of SUVs after 8 of them are sold.

If 36 sedans are sold and 36 SUV are added then there will be an equal number of sedans and SUVs, and if 8 SUV are sold and 8 sedans are added then there will be twice as many sedans as SUVs.
The equations that represent these relationships are $x-36=y+36$ and $x+8=2(y-8)$.

Solving the first equation for y gives $y=x-72$.
Substituting $x-72$ for y in the second equation yields $x+8=2(x-72-8)$.

$x+8=2(x-72-8) \Rightarrow x+8=2(x-80)$
$\Rightarrow x+8=2x-160 \Rightarrow 168=x$

Choice D is correct.

5. C

The sale price of coffee, s, is \$5.25 less than the regular price, r. The equation that represents this relationship is $s=r-5.25$.
The cost of 4 bags of coffee at regular price is the same as the cost of 6 bags of coffee at sale price. The equation that represents this relationship is $4r=6s$.

Choice C is correct.

Section 5-4

1. B

The truck rental cost \$49 a day, so for two days it will cost $2\times\$49$, or \$98. In addition, it cost \$0.40 per mile. If Tom drives m miles the total cost will be $98+0.4m$ dollars. This cost will not be more than \$300 if $98+0.4m\le 300$.

$98+0.4m\le 300 \Rightarrow 0.4m\le 202$
$\Rightarrow m\le\frac{202}{0.4} \Rightarrow m\le 505$

2. D

Let p = the number of paperback copies and let h = the number of hard cover copies.

$p+h=140$	There are 140 paperback and hard cover copies.
$h\le\frac{1}{6}p$	Hard cover copies do not exceed one sixth the number of paperback copies,

Solving the equation for h gives $h=140-p$.
Substitute $140-p$ for h in the inequality.

$140-p\le\frac{1}{6}p \Rightarrow 140-p+p\le\frac{1}{6}p+p$
$\Rightarrow 140\le\frac{7}{6}p \Rightarrow \frac{6}{7}\cdot 140\le\frac{6}{7}\cdot\frac{7}{6}p$
$\Rightarrow 120\le p$

Therefore, the minimum number of paperback copies in Tim's book shelf is 120.

3. A

Let g = the number of students in geometry class and let s = the number of students in Spanish class.

$g=\frac{4}{5}s$	The number of students in a geometry class is four fifths the number of students in a Spanish class.
$g+s\le 54$	The total number of students in both classes does not exceed 54.

Substitute $\frac{4}{5}s$ for g into the inequality.

$\frac{4}{5}s+s\le 54 \Rightarrow \frac{9}{5}s\le 54$
$\Rightarrow \frac{5}{9}\cdot\frac{9}{5}s\le\frac{5}{9}\cdot 54$
$\Rightarrow s\le 30$

Therefore, the greatest possible number of students in the Spanish class is 30.

4. 104

Let s = the price of shoes and
let p = the price of pants.

$s + p = 172$	Jay paid \$172 for a pair of shoes and a pair of pants.
$p < \frac{2}{3}s$	The pants cost less than two thirds of what the shoes cost.

Solving the equation for p gives $p = 172 - s$.
Substitute $172 - s$ for p in the inequality.

$172 - s < \frac{2}{3}s \Rightarrow 172 - s + s < \frac{2}{3}s + s$

$\Rightarrow 172 < \frac{5}{3}s \Rightarrow \frac{3}{5} \cdot 172 < \frac{3}{5} \cdot \frac{5}{3}s$

$\Rightarrow 103.2 < s$

Therefore, the minimum price of the shoes to the nearest dollar is \$104.

5. 14

Let $e =$ the number of hours Ty needs to work on weekends, then $36 - e =$ the number of hours Ty works on weekdays.
Ty earns \$14 an hour working on weekdays and \$21 an hour working on weekends and he wants to make at least \$600. The inequality that represents this relationship is $14(36 - e) + 21e \geq 600$.

$14(36 - e) + 21e \geq 600 \Rightarrow 504 - 14e + 21e \geq 600$

$\Rightarrow 504 + 7e \geq 600 \Rightarrow 7e \geq 96$

$\Rightarrow e \geq \frac{96}{7} (\approx 13.7)$

Therefore, he needs to work at least 14 hours on the weekends.

Chapter 5 Practice Test

1. D

If the apartment manager hires an electrician from company A, he needs to pay 55 dollars per hour. So for x hours, he has to pay $55x$ dollars plus 40 dollars for a service call. Therefore, the total cost, y, of repairing the power generator will be $y = 55x + 40$.

2. C

The total cost, y, of repairing the generator for company B will be $y = 48x + 75$. If the cost of repairing the generator for company B is less than or equal to the total cost of repairing the generator for company A, then $48x + 75 \leq 55x + 40$.

$48x + 75 \leq 55x + 40$
$\Rightarrow 48x + 75 - 48x \leq 55x + 40 - 48x$
$\Rightarrow 75 \leq 7x + 40 \Rightarrow 75 - 40 \leq 7x + 40 - 40$
$\Rightarrow 35 \leq 7x \Rightarrow 5 \leq x$

Choice C is correct.

3. B

The total cost, y, for a service call and hourly charge from company B is given by the equation $y = 48x + 75$. If the relationship is graphed on the xy- plane, the slope of the graph is 48, which is the hourly rate for company B.

Choice B is correct.

4. A

If a car is rented for three days and driven for x miles, the rental charges of Apex Car Rental will be $3 \times 40 + 0.75x$ and the rental charges of Jason Car Rental will be $3 \times 64 + 0.6x$.
The two company's charges will be the same if

$3 \times 40 + 0.75x = 3 \times 64 + 0.6x$.
$120 + 0.75x = 192 + 0.6x$
$120 + 0.75x - 0.6x = 192 + 0.6x - 0.6x$
$120 + 0.15x = 192$
$120 + 0.15x - 120 = 192 - 120$
$0.15x = 72$
$x = 480$

5. A

Let $d =$ the distance in miles from Sara's home to the park. Since average time $= \frac{\text{total distance}}{\text{average speed}}$, the time it took to jog from home to the park $= \frac{d}{8}$ and the time it took to jog from the park to her home $= \frac{d}{6}$. Since the total time for the round trip was 42 minute, or $\frac{42}{60}$ hours, $\frac{d}{8} + \frac{d}{6} = \frac{42}{60}$.

By multiplying each side of the equation by 120, we have $120(\frac{d}{8} + \frac{d}{6}) = 120(\frac{42}{60})$.

$\Rightarrow 15d + 20d = 84 \Rightarrow 35d = 84$

$\Rightarrow d = \frac{84}{35} = 2.4$

6. C

The time it took for Carl to drive to the beach plus the time spent for the return trip equals 2 hours. Therefore $x + y = 2$.
Also the distance of going to the beach equals the returning distance. Use the formula $d = rt$.

The distance to the beach equals to $50x$ and the returning distance equals $30y$. Thus $50x = 30y$.
Choice C is correct.

7. D

Let $x =$ number of months at which both gyms cost the same.
The total cost x months after joining Ace Gym is $180 + 35x$ and the total cost x months after joining Best Gym is $300 + 23x$. If $180 + 35x = 300 + 23x$ the total cost of either gym will be the same.

$180 + 35x - 23x = 300 + 23x - 23x$
$180 + 12x = 300$
$180 + 12x - 180 = 300 - 180$
$12x = 120$
$x = 10$

8. B

If you pay for admission and take r rides, the total cost will be $\$(8 + 1.25r)$.
The total cost does not exceed \$20 if $8 + 1.25r \le 20$.
$8 + 1.25r \le 20 \Rightarrow 8 + 1.25r - 8 \le 20 - 8$
$\Rightarrow 1.25r \le 12 \Rightarrow r \le \frac{12}{1.25} \Rightarrow r \le 9.6$

Therefore, the maximum number of rides you can go on is 9.

9. A

The number of gallons of gas needed to drive $6x$ miles in the city $= \frac{6x}{18} = \frac{1}{3}x$.
The number of gallons of gas needed to drive $18x$ miles on the highway $= \frac{18x}{27} = \frac{2}{3}x$.
Total number of gallons of gas needed equals $\frac{1}{3}x + \frac{2}{3}x$, or x.

10. B

If x represents the number of 6-bottle packages and y represents the number of 8-bottle packages, then $x + y$ represents the total number of packages.
Thus, $x + y = 270$.
If x is the number of 6-bottle packages, then there are $6x$ water bottles and if y is the number of 8-bottle packages , then there are $8y$ water bottles.
Thus, $6x + 8y = 1860$.

Choice B is correct.