

42 pts

Unit 5: Real World Applications
PRE-TEST

Solve each question. Round your answer to the nearest hundredth when needed.

1. Working alone, it takes Tim 12 minutes to sweep a porch. Chelsea can sweep the same porch in 10 minutes. How long would it take if they worked together?

2pts

5.45 minutes

2. Working alone, Kayla can oil the lanes in a bowling alley in nine hours. One day Doug helped her, and it only took 4.24 hours. How long would it take Doug to do it alone?

2pts

8.02 hours

3. An Air Force plane left Paris and flew east at an average speed of 235 km/h. Sometime later a cargo plane left flying in the opposite direction with an average speed of 465 km/h. After the Air Force plane had flown for seven hours the planes were 4900 km apart. How long did the cargo plane fly?

2pts

7 hours

4. Kali left home and drove toward the desert at an average speed of 36 mph. Wilbur left two hours later and drove in the same direction but with an average speed of 60 mph. How long did Kali drive before Wilbur caught up?

2pts

5 hours

5. Jill wants to make 15 fluid ounces of a 29% saline solution by mixing a 20% saline solution and a 65% saline solution. How much of each solution must she use?

4pts

12 oz of the 20% saline solution
3 oz of the 65% saline solution

6. Mark asked you to make 9 gallons of fruit punch that contains 15% fruit juice by mixing some amount of Brand A fruit punch and some amount of Brand B fruit punch. Brand A contains 25% fruit juice and Brand B contains 10% fruit juice. How much of each do you need?

4pts

3 gallons of Brand A
6 gallons of Brand B

16pts

7. The difference between the two numbers is 3. Their sum is 25. What are the numbers?

2pts

The numbers are 11 & 14

8. Amanda and Alberto are selling cheesecakes for a school fundraiser. Customers can buy pecan cheesecakes and chocolate marble cheesecakes. Amanda sold 3 pecan cheesecakes and 3 chocolate marble cheesecakes for a total of \$87. Alberto sold 10 pecan cheesecakes and 3 chocolate marble cheesecakes for a total of \$185. Find the cost each of one pecan cheesecake and one chocolate marble cheesecake.

4pts

\$14 per pecan cheesecake
\$15 per chocolate marble cheesecake

9. Karlee and Emily each improved their yards by planting daylilies and geraniums. They bought their supplies from the same store. Karlee spent \$61 on 10 daylilies and 3 geraniums. Emily spent \$117 on 10 daylilies and 11 geraniums. What is the cost of one daylily and the cost of one geranium?

4pts

\$4 per daylily
\$7 per geranium

10. The school that Jose goes to is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 13 senior citizen tickets and 6 student tickets for a total of \$198. The school took in \$197 on the second day by selling 10 senior citizen tickets and 11 student tickets. What is the price for each, one senior citizen ticket and one student ticket?

4pts

\$12 per senior citizen
\$7 per student

11. Chicago is a popular field trip destination. This year the senior class at HAHS and the senior class at Bismarck both planned trips there. The senior class at HAHS rented and filled 6 vans and 11 buses with 690 students. Bismarck rented and filled 4 vans and 2 buses with 172 students. Every van had the same number of students in it as did the buses. How many students can a van carry? How many students can a bus carry?

4pts

16 students per Van
54 students per Bus

12. Going down the river a boat went 11 km/h. Going up the river it only went 1 km/h. Find the speed of the boat in still water and the speed of the current.

4pts

6 km/h for the Boat
5 km/h for the Current

13. A boat traveled 72 miles each way downstream and back. The trip downstream took 4 hours. The trip back took 18 hours. Find the speed of the boat in still water and the speed of the current.

4pts

11 mph for the Boat
7 mph for the Current

26pts

$$\textcircled{1} \text{ Tim's rate} = \frac{1 \text{ porch}}{12 \text{ minutes}}$$

$$\text{Chelsea's rate} = \frac{1 \text{ porch}}{10 \text{ minutes}}$$

$$\text{Together: } \frac{1}{12}t + \frac{1}{10}t = 1$$

$$120 \cdot \left[\frac{1}{12}t + \frac{1}{10}t = 1 \right] \cdot 120$$

$$\frac{120}{12}t + \frac{120}{10}t = 120$$

$$10t + 12t = 120$$

$$\frac{22t}{22} = \frac{120}{22}$$

$$t = 5.4545 \text{ nearest hundredth } \boxed{5.45 \text{ min}}$$

$$\textcircled{2} \text{ Kayla's rate} = \frac{1 \text{ alley}}{9 \text{ hours}}$$

$$\text{Doug's rate} = \frac{1 \text{ alley}}{h \text{ hours}}$$

Kayla & Doug together
4.24 hours

$$\text{Together: } \frac{1}{9}(4.24) + \frac{1}{h}(4.24) = 1$$

$$\frac{4.24}{9} + \frac{4.24}{h} = 1$$
$$\frac{-4.24}{9} \qquad \frac{-4.24}{9}$$

$$\frac{4.24}{h} \quad \begin{matrix} \nearrow & \searrow \\ \nwarrow & \nearrow \end{matrix} \quad \frac{119}{225}$$

$$\frac{119h}{119} = \frac{954}{119}$$

$$h = 8.016806723 \text{ nearest hundredth}$$

$$\boxed{8.02 \text{ hours}}$$

③

$$R \cdot T = D$$

Air Force Plane	235 Km/h	7 hrs	= 1645 Km
Cargo Plane	465 Km/h	t	= 465t

$$1645 + 465t = 4900$$

$$\begin{array}{r} 1645 \\ -1645 \end{array} \qquad \begin{array}{r} -1645 \\ -1645 \end{array}$$

$$\frac{465t}{465} = \frac{3255}{465}$$

$$t = 7 \text{ hours}$$

④

$$R \cdot T = D$$

Kali	36 mph	t hours	36t
Wilbur	60 mph	(t-2) hours	60t-120

$$36t = 60t - 120$$

$$\begin{array}{r} -60t \\ -60t \end{array} \qquad \begin{array}{r} -60t \\ -60t \end{array}$$

$$\frac{-24t}{-24} = \frac{-120}{-24}$$

$$t = 5 \text{ hours}$$

$$(5) \quad a + b = 15$$

$$0.20a + 0.65b = 0.29(15) \rightarrow 0.20a + 0.65b = 4.35$$

Method 1 - Substitution

$$\begin{array}{r} a + b = 15 \\ -b \quad -b \\ \hline \end{array}$$

$$a = 15 - b$$

$$\begin{array}{l} 0.20(15 - b) + 0.65b = 4.35 \\ 3 - 0.20b + 0.65b = 4.35 \end{array}$$

$$\begin{array}{r} 3 + 0.45b = 4.35 \\ -3 \quad \quad -3 \\ \hline \end{array}$$

$$\begin{array}{r} 0.45b = 1.35 \\ 0.45 \quad 0.45 \\ \hline \end{array}$$

$$b = 3 \text{ oz}$$

So $a + b = 15$

$$\begin{array}{r} a + 3 = 15 \\ -3 \quad -3 \\ \hline \end{array}$$

$$a = 12 \text{ oz}$$

Method 2 - Elimination

$$\begin{array}{r} -0.2[a + b = 15] \cdot -0.2 \\ 0.20a + 0.65b = 4.35 \\ -0.20a - 0.20b = -3 \\ \hline \end{array}$$

$$\begin{array}{r} 0.45b = 1.35 \\ 0.45 \quad 0.45 \\ \hline \end{array}$$

$$b = 3 \text{ oz}$$

$$a + b = 15$$

$$\begin{array}{r} a + 3 = 15 \\ -3 \quad -3 \\ \hline \end{array}$$

$$a = 12 \text{ oz}$$

Jill will need:

12 oz of the 20% saline solution
3 oz of the 65% saline solution

$$(6) \quad A + B = 9$$

$$0.25A + 0.10B = 9(0.15) \rightarrow 0.25A + 0.10B = 1.35$$

Method 1 - Substitution

$$\begin{array}{r} A + B = 9 \\ -B \quad -B \\ \hline A = 9 - B \end{array}$$

$$0.25(9 - B) + 0.10B = 1.35$$

$$2.25 - 0.25B + 0.10B = 1.35$$

$$\begin{array}{r} 2.25 - 0.15B = 1.35 \\ -2.25 \quad -2.25 \\ \hline -0.15B = -0.9 \end{array}$$

$$\begin{array}{r} -0.15B = -0.9 \\ -0.15 \quad -0.15 \\ \hline B = 6 \end{array}$$

$$\boxed{B = 6}$$

So

$$\begin{array}{r} A + B = 9 \\ A + 6 = 9 \\ -6 \quad -6 \\ \hline A = 3 \end{array}$$

$$\boxed{A = 3}$$

Method 2 - Elimination

$$\begin{array}{r} -10[A + B = 9] \cdot -0.10 \\ 0.25A + 0.10B = 1.35 \\ -0.10A - 0.10B = -0.9 \\ \hline 0.15A \quad = 0.45 \\ \underline{0.15} \quad \underline{0.15} \end{array}$$

$$\boxed{A = 3}$$

$$\begin{array}{r} A + B = 9 \\ 3 + B = 9 \\ -3 \quad -3 \\ \hline B = 6 \end{array}$$

$$\boxed{B = 6}$$

You will need:

3 gallons of Brand A
6 gallons of Brand B

⑦ Difference
Sum

$$\begin{array}{r} a - b = 3 \\ a + b = 25 \end{array}$$

$$\frac{2a}{2} = \frac{28}{2}$$

$$\boxed{a = 14}$$

so

$$\begin{array}{r} 14 - b = 3 \\ -14 \quad -14 \end{array}$$

$$\frac{-b}{-1} = \frac{-11}{-1}$$

$$\boxed{b = 11}$$

⑧

Amanda

$$3p + 3c = 87$$

Alberto

$$10p + 3c = 185$$

multiply by -1

Keep so the c's cancel

$$-3p - 3c = -87$$

$$10p + 3c = 185$$

$$\frac{7p}{7} = \frac{98}{7}$$

$$\boxed{p = \$14}$$

Amanda

$$3p + 3c = 87$$

$$3(14) + 3c = 87$$

$$42 + 3c = 87$$

$$\begin{array}{r} -42 \quad -42 \end{array}$$

$$\frac{3c}{3} = \frac{45}{3}$$

$$\boxed{c = \$15}$$

One Pecan costs \$14 ; One Chocolate Marble costs \$15

9

Karlee

$$10d + 3g = 61$$

Keep the same

Emily

$$10d + 11g = 117$$

multiply by -1

$$\begin{array}{r} 10d + 3g = 61 \\ -10d - 11g = -117 \\ \hline \end{array}$$

$$\begin{array}{r} -8g = -56 \\ \hline -8 \quad -8 \end{array}$$

$$g = \$7$$

Karlee

$$10d + 3g = 61$$

$$10d + 3(7) = 61$$

$$10d + 21 = 61$$

$$\begin{array}{r} -21 \quad -21 \\ \hline \end{array}$$

$$\begin{array}{r} 10d = 40 \\ \hline 10 \quad 10 \end{array}$$

$$d = \$4$$

One daylily costs \$4; One geranium costs \$7

10

Let $s =$ seniors $k =$ kids (students)

Day 1 $13s + 6k = 198$

multiply by 11

Day 2 $10s + 11k = 197$

multiply by -6

$$\begin{array}{r} 143s + 66k = 2178 \\ -60s - 66k = -1182 \\ \hline 83s = 996 \\ \hline 83 \quad 83 \end{array}$$

$$s = \$12$$

Using Day 1

$$13(12) + 6k = 198$$

$$\begin{array}{r} 156 + 6k = 198 \\ \hline -156 \quad -156 \end{array}$$

$$6k = 42$$

$$\begin{array}{r} 6 \quad 6 \\ \hline k = 7 \end{array}$$

Senior Citizens \$12; students \$7

11

HAHS
BHRA

$$\begin{aligned} 6v + 11b &= 690 \\ 4v + 2b &= 172 \end{aligned}$$

Divide by 2;
then mult by -11

$$\begin{aligned} 6v + 11b &= 690 \\ -22v - 11b &= -946 \\ \hline -16v &= -256 \\ \underline{-16} & \quad \underline{-16} \end{aligned}$$

$$v = 16$$

Using BHRA

$$\begin{aligned} 4(16) + 2b &= 172 \\ 64 + 2b &= 172 \\ \underline{-64} & \quad \underline{-64} \\ 2b &= 108 \\ \frac{2b}{2} &= \frac{108}{2} \end{aligned}$$

$$b = 54$$

Vans take 16 students; Buses take 54 students

12

Down Stream
Up Stream

$$\begin{aligned} B + C &= 11 \\ B - C &= 1 \end{aligned}$$

$$\frac{2B}{2} = \frac{12}{2}$$

$$B = 6$$

Using Down Stream

$$\begin{aligned} B + C &= 11 \\ 6 + C &= 11 \\ \underline{-6} & \quad \underline{-6} \end{aligned}$$

$$C = 5$$

Boat Speed is 6 Km/h ; Current speed is 5 Km/h

13

Down stream	$B + C$	4	72
up stream	$B - C$	18	72

Down stream

$$\frac{4(B+C)}{4} = \frac{72}{4}$$

$$B + C = 18$$

Upstream

$$\frac{18(B-C)}{18} = \frac{72}{18}$$

$$B - C = 4$$

$$B + C = 18$$

$$B - C = 4$$

$$\frac{2B}{2} = \frac{22}{2}$$

$$B = 11$$

Using downstream

$$B + C = 18$$

$$11 + C = 18$$

$$\begin{array}{r} -11 \\ \hline \end{array}$$

$$C = 7$$

Boat speed is 11 mph; Current is 7 mph