

## Monitoring Sheet: Please reflect on your week!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
<b>Monday</b> Date: <u>9/18</u> Topic: <u>Movie Ticket Analysis</u>	0 1 2	
<b>Tuesday</b> Date: <u>9/19</u> Topic: <u>HowOld.net Analysis</u>	0 1 2	
<b>Wednesday</b> Date: <u>9/20</u> Topic: <u>No homework - yesterday was a quiz.</u>	0 1 2	
<b>Thursday</b> Date: <u>9/21</u> Topic: <u>19A Graphing Systems of Equations</u>	0 1 2	
<b>Friday</b> Date: <u>9/22</u> Topic: <u>19BC Solving by Substitution &amp; Elimination</u>	0 1 2	

HAPPY FRIDAY!



## Warm-up: (p.374)

### OPENING PROBLEM

Ewen wants to buy a pie, but only has \$3.50. He sees his friend André leaving the canteen with a pie, and asks him how much it cost.

"I'm not sure," said André, "I bought a pie and a sandwich. They cost me \$7 altogether."

Ewen saw another friend Samuel with a pie, and asked him how much it cost.

"Well, I bought 2 pies and 3 sandwiches, and they cost me \$17 altogether."



How much does a pie cost? sandwich cost?

Warm-up: (p.374) How much does a pie cost?  
sandwich cost?

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$x$ : pies \$  
 $y$ : sand. \$  
 $x = 4$  \$

$$\begin{aligned} (x+y=7)(-3) \\ 2x+3y=17 \\ -3x-3y=-21 \\ \hline -x &= -4 \end{aligned}$$

$$\begin{aligned} 2(4)+3y=17 \\ 8+3y=17 \\ \hline -8 \quad -8 \\ 3y=9 \\ \boxed{y=3\$} \end{aligned}$$

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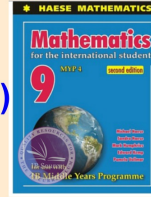
$$\begin{aligned} p + s &= 7 \\ 2p + 3s &= 17 \\ (-2)(p + s = 7) \\ 2p + 3s &= 17 \\ -2p - 2s &= -14 \\ \hline 2p + 3s &= 17 \\ -2p - 2s &= -14 \\ \hline s &= 3 \end{aligned}$$

$p + 3 = 7$  Pie = \$4 and  
 $p = 4$  Sandwiches = \$3

Since Ewen has \$3.50, he cannot afford a pie :(

## Class Plan 1. Warm-up

1. Get textbooks  
need:  (Name on inside  
cover of textbook)  
20 texts available.



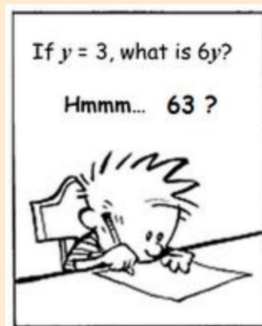
**Volunteer to be online :)**

2. 19D Problem Solving

3. Joke Break :)

4. Practice

Joke Break :)



**What is the  
correct  
answer?**

**D****PROBLEM SOLVING**

Many problems can be described mathematically by a **pair of linear equations**. The **Opening Problem** is one example.

Once the equations are formed, they can then be solved simultaneously, and we can then answer the original problem.

*Step 1:* Decide on two unknowns such as  $x$  and  $y$ . Do not forget the units.

*Step 2:* Write down **two** equations connecting  $x$  and  $y$ .

*Step 3:* Solve the equations simultaneously.

*Step 4:* Check your solutions with the original data given.

*Step 5:* Give your answer in sentence form.

The form of the original equations will help you decide whether to use substitution or elimination.

**Example 6**

Two numbers have a sum of 45 and a difference of 13. Find the numbers.

$$\begin{array}{r} x + y = 45 \\ x - y = 13 \\ \hline 2x = 58 \\ x = 29 \end{array}$$

$$\begin{array}{r} 29 + y = 45 \\ -29 \quad -29 \\ \hline y = 16 \end{array}$$

**Example 6**

Two numbers have a sum of 45 and a difference of 13. Find the numbers.

Let  $x$  and  $y$  be the unknown numbers, where  $x > y$ .

From the information given,

$$x + y = 45 \quad \dots (1) \quad \{\text{'sum' means add}\}$$

$$\text{and } x - y = 13 \quad \dots (2) \quad \{\text{'difference' means subtract}\}$$

$$\text{Adding, } \begin{array}{r} 2x = 58 \\ \hline \end{array}$$

$$\therefore x = 29$$

$$\text{Substituting } x = 29 \text{ into (1) gives } 29 + y = 45$$

$$\therefore y = 16$$

The numbers are 29 and 16.

$$\text{Check: In (1): } 29 + 16 = 45 \quad \checkmark \quad \text{In (2): } 29 - 16 = 13 \quad \checkmark$$

We need to find two equations containing two unknowns.

**Example 7****Self Tutor**

When shopping in Jamaica, 5 coconuts and 14 bananas cost \$8.70, and 8 coconuts and 9 bananas cost \$9.90.

Find the cost of each coconut and each banana.

$$\begin{array}{l} (5c + 14b = 8.7) \times 8 \\ (8c + 9b = 9.9) \times 5 \end{array}$$

$$8c + 9(.3) = 9.9$$

$$8c + 2.7 = 9.9$$

$$8c = 7.2$$

$$\boxed{\$ C = .9}$$

$$\begin{array}{l} 40c + 112b = 69.6 \\ \rightarrow -40c - 45b = -49.5 \\ \hline \end{array}$$

$$\frac{67b = 20.1}{67} \quad \frac{\$}{67}$$

$$\boxed{b = .3}$$

**Example 7****Self Tutor**

When shopping in Jamaica, 5 coconuts and 14 bananas cost \$8.70, and 8 coconuts and 9 bananas cost \$9.90.

Find the cost of each coconut and each banana.

Let each coconut cost  $x$  cents, and each banana cost  $y$  cents.

$$\begin{aligned} \therefore 5x + 14y &= 870 \quad \dots (1) \\ \text{and } 8x + 9y &= 990 \quad \dots (2) \end{aligned}$$

To eliminate  $x$ , we multiply (1) by 8 and (2) by  $-5$ .

$$\begin{aligned} \therefore 40x + 112y &= 6960 && \{(1) \times 8\} \\ -40x - 45y &= -4950 && \{(2) \times -5\} \\ \text{Adding,} & & & \\ \hline 67y &= 2010 & & \\ \therefore y &= 30 & & \end{aligned}$$

Substituting  $y = 30$  in (2) gives  $8x + 9(30) = 990$

$$\begin{aligned} \therefore 8x + 270 &= 990 \\ \therefore 8x &= 720 \\ \therefore x &= 90 \end{aligned}$$

Check: In (1):  $5 \times 90 + 14 \times 30 = 450 + 420 = 870$  ✓  
In (2):  $8 \times 90 + 9 \times 30 = 720 + 270 = 990$  ✓

The coconuts cost 90 cents each, and the bananas cost 30 cents each.

The units are cents on both sides of each equation.

**Example 8****Self Tutor**

I have only five cent and ten cent coins in my pocket. I have 24 coins altogether, and their total value is \$1.55. How many of each type of coin do I have?

$a$ : # of \$0.05 coins

$b$ : # of \$0.10 coins

$$(a+b=24)(-1)$$

$$.05a + .1b = 1.55$$

$$-.1a - .1b = -2.4$$

$$\begin{array}{r} -.05a = -.85 \\ \hline -.05 \quad -.05 \end{array}$$

$$a = 17$$

17 5¢ coins

7 10¢ coins

**Example 8****Self Tutor**

I have only five cent and ten cent coins in my pocket. I have 24 coins altogether, and their total value is \$1.55. How many of each type of coin do I have?

Let  $x$  be the number of five cent coins, and  $y$  be the number of ten cent coins.

$$\begin{aligned} \therefore x + y &= 24 \quad \dots (1) \quad \{\text{the total number of coins}\} \\ \text{and } 5x + 10y &= 155 \quad \dots (2) \quad \{\text{the total value of the coins in cents}\} \end{aligned}$$

To eliminate  $x$ , we multiply (1) by  $-5$ .

$$\begin{array}{r} \therefore -5x - 5y = -120 \quad \{(1) \times -5\} \\ \quad \quad \quad 5x + 10y = 155 \quad \{(2)\} \\ \hline \text{Adding,} \quad \quad \quad 5y = 35 \\ \therefore y = 7 \end{array}$$

$$\begin{aligned} \text{Substituting } y = 7 \text{ into (1) gives } x + 7 &= 24 \\ \therefore x &= 17 \end{aligned}$$

$$\begin{aligned} \text{Check: In (1): } 17 + 7 &= 24 \quad \checkmark \\ \text{In (2): } 5 \times 17 + 10 \times 7 &= 85 + 70 = 155 \quad \checkmark \end{aligned}$$

I have 17 five cent coins and 7 ten cent coins in my pocket.

**Exercises... 19D**

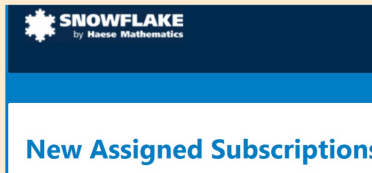
There are 12 problems...Choose 6

Be efficient! Which method is best?

**Online Access:**

You will receive an email from  
"Snowflake Haese Mathematics" in  
your school email!

hpau2101@  
mpsedu.org



## Exercises... 19D

### Solutions

#### EXERCISE 19D

- 1 56 and 16
- 2 22 and 8
- 3 17 and 51
- 4 fish costs £2.20 each, chips cost £0.75 per serve
- 5 coffee costs €2.90 per cup, muffins cost €1.25 each
- 6 30 fifty cent coins; 26 ten cent coins
- 7 Anthony has €26.10, Michelle has €39.15
- 8 33, 600 mL cartons; 60, 1 L cartons
- 9  $a = 3$ ,  $b = 5$
- 10 length 18 cm, width 10 cm
- 11 before 3 pm: \$2.50/h, after 3 pm: \$4/h
- 12 6 small sets and 5 large sets

## Exercises... 19D

#### EXERCISE 19D

- 1 The sum of two numbers is 72, and their difference is 40. Find the numbers.
- 2 Two numbers have a sum of 30. Half of their difference is 7. Find the numbers.
- 3 The larger of two numbers is three times the smaller number, and their difference is 34. Find the two numbers.



## Exercises... 19D

- 4 Three pieces of fish and two serves of chips cost a total of £8.10. Five pieces of fish and three serves of chips cost a total of £13.25. Find the cost of each piece of fish and each serve of chips.



## Exercises... 19D

- 5 Seven cups of coffee and four muffins cost a total of €25.30. Two cups of coffee and three muffins cost a total of €9.55. Find the cost of each item.

- 6 Margaret saves fifty cent and ten cent coins. She has 56 of these coins, and their total value is \$17.60. How many of each coin type does she have?

## Exercises... 19D

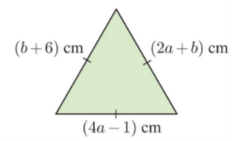
- 7 Anthony and Michelle have €65.25 between them. Anthony's amount is two thirds of Michelle's amount. How much money does each have?

## Exercises... 19D

- 8 Milk is sold in either 600 mL or 1 L cartons. A supermarket manager ordered 79.8 litres of milk and received 93 cartons. How many of each size carton did the manager receive?

## Exercises... 19D

- 9 The triangle alongside is equilateral.  
Find  $a$  and  $b$ .



## Exercises... 19D

- 10 A rectangle has perimeter 56 cm. If 4 cm is taken from the length and added to the width, the rectangle becomes a square. Find the dimensions of the original rectangle.

## Exercises... 19D

- 11 A car park charges a certain rate per hour before 3 pm, and a higher rate per hour after 3 pm. Parking from 11 am to 5 pm costs \$18, and parking from 9 am to 7 pm costs \$31. Find the rates charged before and after 3 pm.



## Exercises... 19D

- 12 An art store sells small and large painting sets. The small sets contain 2 brushes and 3 tubes of paint, and the large sets contain 5 brushes and 8 tubes of paint. Leanne bought some of each of these sets to use as gifts. In total she received 37 brushes and 58 tubes of paint. How many of each set did she buy?

*X: # of small*

*Y: # of large sets*

$$37 = 2x + 5y$$

$$58 = 3x + 8y$$

