

NUMERACY: The Basics Workbook



Set Y: Averages

Companion Workbook to Numeracy: The Basics Video Series

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INTRODUCTION

What is Numeracy: The Basics Workbook?

This workbook is intended to accompany Workplace Education Manitoba's (WEM) Numeracy: The Basics Video Series, a set of 50 videos that explain essential numeracy concepts.

The refresher videos cover 25 critical numeracy topics, each broken into concept and practice.

The video series and accompanying downloadable workbooks can be found on the WEM website at http://www.wem.mb.ca/learning_on_demand.aspx

These Numeracy: The Basics workbooks provide an opportunity for additional skill-building practice.

Numeracy: The Basics topics are:

- Order of Operations 1
- Order of Operations 2
- Adding & Subtracting Fractions 1
- Adding & Subtracting Fractions 2
- Multiplying & Dividing Fractions
- Mixed & Improper Fractions
- Operations with Mixed Fractions 1
- Operations with Mixed Fractions 2
- Operations with Mixed Fractions 3
- Adding & Subtracting Decimals
- Multiplying Decimals
- Dividing Decimals
- Order of Operations & Decimals
- Decimals, Fractions & Percent 1
- Decimals, Fractions & Percent 2
- Imperial Conversions
- Metric Conversions
- Metric and Imperial Conversions
- Geometry 1 – Perimeter
- Geometry 2 – Area
- Geometry 3- Volume
- Solving Equations 1
- Solving Equations 2
- Ratio & Proportion
- Averages



AVERAGES

This workbook contains five skill-building practice sections. Solutions can be found at the end of the workbook.

Practice Section A

Calculate the average of the numbers given.

1. 3, 5 = _____
2. 3, 7 = _____
3. 4, 8 = _____
4. 2, 14 = _____
5. 5, 17 = _____
6. 13, 51 = _____
7. 43, 45 = _____
8. 33, 33 = _____
9. 13, 59 = _____
10. 62, 44 = _____
11. 78, 84 = _____
12. 73, 85 = _____
13. 61, 99 = _____
14. 199, 201 = _____
15. 83, 84 = _____

**Practice Section B**

Calculate the average of the numbers given. Round each answer to two decimal places, if rounding is necessary.

1. 3.5, 6.5 = _____

2. 3.5, 14.5 = _____

3. 2.5, 5.7 = _____

4. 4.6, 7.7 = _____

5. 2.9, 5.8 = _____

6. 3, 6, 9 = _____

7. 2, 5, 14 = _____

8. 4, 5, 6 = _____

9. 2, 5, 17 = _____

10. 3, 6, 18 = _____

11. 3.6, 5.9, 7.2 = _____

12. 2.4, 5.3, 9.8 = _____

13. 7.5, 7.5, 18.6 = _____

14. 1, 2.3, 52.5 = _____

15. 1.3, 2.05, 9.761 = _____

**Practice Section C**

Find the missing value in each question. The average \bar{x} is given..

1. $x, 25 \rightarrow \bar{x} = 20$ = _____

2. $130, x \rightarrow \bar{x} = 26$ = _____

3. $2, x, 14 \rightarrow \bar{x} = 13$ = _____

4. $14, 17, x \rightarrow \bar{x} = 33$ = _____

5. $x, 14, 102 \rightarrow \bar{x} = 40$ = _____

Practice Section D

In this section, solutions for the practice questions contain commonly-made errors. For this question, circle the error(s) and give a correct solution.

1. The average of 5, x , 6, 9, and 10 is 7. Find the value of x .

Solution:

$$\frac{5 + x + 6 + 9 + 10}{5} = 7$$

$$\frac{30 + x}{5} = 7$$

$$\frac{\cancel{(6)}30 + x}{\cancel{(1)}5} = 7$$

$$6 + x = 7$$

$$x = 1$$

= _____

**Practice Section E**

Challenge Question. If you can do this one, then you get an A⁺. ☺

The mark breakdown (in percent) for a particular high school math course is given below on the left. A student's actual scores are given on the right.

Using the mark breakdown, calculate the final grade for the student if all assignments are out of 20, all quizzes are out of 10 and each test is worth 7% of the final grade.

Mark Breakdown

Final Exam: 30%

Tests: 42%

Assignments: 18%

Quizzes: 10%
100%

Student's Actual Scores

Final Exam: $\frac{88}{115}$

Tests: $\frac{32}{41}$, $\frac{21}{25}$, $\frac{35}{43}$, $\frac{23}{35}$, $\frac{17}{35}$, $\frac{16}{31}$

Assignments: 14, 16, 20, 19, 13, 19, 14, 17
(each out of 20)

Quizzes: 5, 6, 8, 8, 9, 10, 5, 6, 7, 9, 7, 6, 8, 10, 10
(each out of 10)

Final Grade: = _____



SOLUTIONS

Set Y

Averages

**AVERAGES****Practice Section A**

1. Solution:

$$\frac{3+5}{2} = \frac{8}{2} = 4$$

2. Solution:

$$\frac{3+7}{2} = \frac{10}{2} = 5$$

3. Solution:

$$\frac{4+8}{2} = \frac{12}{2} = 6$$

4. Solution:

$$\frac{2+14}{2} = \frac{16}{2} = 8$$

5. Solution:

$$\frac{5+17}{2} = \frac{22}{2} = 11$$

6. Solution:

$$\frac{13+51}{2} = \frac{64}{2} = 32$$

7. Solution:

$$\frac{43+45}{2} = \frac{88}{2} = 44$$

8. Solution:

$$\frac{33+33}{2} = \frac{66}{2} = 33$$

9. Solution:

$$\frac{13+59}{2} = \frac{72}{2} = 36$$

10. Solution:

$$\frac{62+44}{2} = \frac{106}{2} = 53$$

11. Solution:

$$\frac{78+84}{2} = \frac{162}{2} = 81$$

12. Solution:

$$\frac{73+85}{2} = \frac{158}{2} = 79$$

13. Solution:

$$61,99$$
$$\frac{61+99}{2} = \frac{160}{2} = 80$$

14. Solution:

$$199,201$$
$$\frac{199+201}{2} = \frac{400}{2} = 200$$

15. Solution:

$$83,84$$
$$\frac{83+84}{2} = \frac{167}{2} = 83.5$$

**Practice Section B**

1. Solution:

3.5, 6.5

$$\frac{3.5 + 6.5}{2} = \frac{10}{2} = 5$$

2. Solution:

$$\frac{3.5 + 14.5}{2} = \frac{18}{2} = 9$$

3. Solution:

$$\frac{2.5 + 5.7}{2} = \frac{8.2}{2} = 4.1$$

4. Solution:

$$\frac{4.6 + 7.7}{2} = \frac{12.3}{2} = 6.15$$

5. Solution:

$$\frac{2.9 + 5.8}{2} = \frac{8.7}{2} = 4.35$$

6. Solution:

$$\frac{3 + 6 + 9}{3} = \frac{18}{3} = 6$$

7. Solution:

$$\frac{2 + 5 + 14}{3} = \frac{21}{3} = 7$$

8. Solution:

$$\frac{4 + 5 + 6}{3} = \frac{15}{3} = 5$$

9. Solution:

$$\frac{2 + 5 + 17}{3} = \frac{24}{3} = 8$$

10. Solution:

$$\frac{3 + 6 + 18}{3} = \frac{27}{3} = 9$$

11. Solution:

$$\frac{3.6 + 5.9 + 7.2}{3} = \frac{16.7}{3} = 5.57$$

12. Solution:

$$\frac{2.4 + 5.3 + 9.8}{3} = \frac{17.5}{3} = 5.83$$

13. Solution:

$$\frac{7.5 + 7.5 + 18.6}{3} = \frac{33.6}{3} = 11.2$$

14. Solution:

$$\frac{1 + 2.3 + 52.5}{3} = \frac{55.8}{3} = 18.6$$

15. Solution:

$$\frac{1.3 + 2.05 + 9.761}{3} = \frac{13.111}{3} = 4.37$$

**Practice Section C**

1. Solution:

$$\frac{x+25}{2} = 20$$

$$\cancel{(2)} \frac{x+25}{\cancel{2}} = 20(2)$$

$$x+25 = 40$$

$$x = 40 - 25$$

$$x = 15$$

2. Solution:

$$\frac{13+x}{2} = 26$$

$$\cancel{(2)} \frac{13+x}{\cancel{2}} = 26(2)$$

$$13+x = 52$$

$$x = 52 - 13$$

$$x = 39$$

3. Solution:

$$\frac{2+x+14}{3} = 13$$

$$\cancel{(3)} \frac{2+x+14}{\cancel{3}} = 13(3)$$

$$2+x+14 = 39$$

$$x+16 = 39$$

$$x = 39 - 16$$

$$x = 23$$

4. Solution:

$$\frac{14+17+x}{3} = 33$$

$$\cancel{(3)} \frac{14+17+x}{\cancel{3}} = 33(3)$$

$$14+17+x = 99$$

$$31+x = 99$$

$$x = 99 - 31$$

$$x = 68$$

5. Solution:

$$\frac{x+14+102}{3} = 40$$

$$\cancel{(3)} \frac{x+14+102}{\cancel{3}} = 40(3)$$

$$x+14+102 = 120$$

$$x+116 = 120$$

$$x = 120 - 116$$

$$x = 4$$

**Practice Section D**

Solution:

1. There is one error that occurs on line 3 of the solution where $\frac{30}{5}$ is reduced to $\frac{6}{1}$.

Rather than reducing part of the fraction by 5, each side of the equation must be multiplied by 5.

Line 3 could be rewritten as $\frac{30}{5} + \frac{x}{5} = 7 \Rightarrow 6 + \frac{x}{5} = 7$, which allows us to reduce the fraction on the left, but this does not help much in solving the equation. Each side of the equation must still be multiplied by 5, but now the left side of the equation has become more complicated.

- a. The correct solution is:

$$\frac{5 + x + 6 + 9 + 10}{5} = 7$$

$$\frac{30 + x}{5} = 7$$

$$\cancel{(5)} \frac{30 + x}{\cancel{5}} = 7(5)$$

$$30 + x = 35$$

$$x = 35 - 30$$

$$x = 5$$

Practice Section E

Solution:

The average of each category needs to be weighted. This means find the average for each category, as a decimal, and then multiply by the specific weighting.

$$\begin{aligned} & 30 \left(\frac{88}{115} \right) \\ & + 42 \left(\left(\frac{32}{41} + \frac{21}{25} + \frac{35}{43} + \frac{23}{35} + \frac{17}{35} + \frac{16}{31} \right) / 6 \right) \\ & + 18 \left(\left(\frac{14 + 16 + 20 + 19 + 13 + 19 + 14 + 17}{8} \right) / 20 \right) \\ & + 10 \left(\left(\frac{5 + 6 + 8 + 8 + 9 + 10 + 5 + 6 + 7 + 9 + 7 + 6 + 8 + 10 + 10}{15} \right) / 10 \right) \\ & = 22.96\% + 28.65\% + 14.85\% + 7.6\% \\ & = 74.06\% \end{aligned}$$

The student's final grade in the course is 74.06%