

# NUMERACY:

## The Basics Workbook



### Set B: Order of Operations 2

Companion Workbook to Numeracy: The Basics Video Series

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## INTRODUCTION

### What is Numeracy: The Basics Workbook?

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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](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



## ORDER OF OPERATIONS 2

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

### Practice Section A

Calculate the answer to each of the following questions by performing the correct order of operations.

1.  $(9+6)-2 = \underline{\hspace{2cm}}$

2.  $8 \div (2+6) = \underline{\hspace{2cm}}$

3.  $16 \div (2+6) = \underline{\hspace{2cm}}$

4.  $(18-6) \div 3 = \underline{\hspace{2cm}}$

5.  $(14-6) \times 2 = \underline{\hspace{2cm}}$

6.  $(13+5) \div 2 = \underline{\hspace{2cm}}$

7.  $(5-2) + (6+2) = \underline{\hspace{2cm}}$

8.  $6 \times (4-2) = \underline{\hspace{2cm}}$

9.  $15 \div (3+2) = \underline{\hspace{2cm}}$

10.  $15 \div (15 \div 3) = \underline{\hspace{2cm}}$

11.  $18 + 6 \div (2+4) = \underline{\hspace{2cm}}$

12.  $21 \div (5-2) + 7 = \underline{\hspace{2cm}}$

13.  $(4+8) \div 2 - 6 = \underline{\hspace{2cm}}$

14.  $2 \times (7-2) + 3 = \underline{\hspace{2cm}}$

15.  $(4+8) \div (6-2) = \underline{\hspace{2cm}}$

**Practice Section B**

Calculate the answer to each of the following questions by performing the correct order of operations.

1.  $20 \div 4 - (5 - 2)$  = \_\_\_\_\_

2.  $24 \div (24 \div 12) + 4$  = \_\_\_\_\_

3.  $3 \times 6 + (7 - 2) + 3$  = \_\_\_\_\_

4.  $(4 \times 2) + (12 \div 3)$  = \_\_\_\_\_

5.  $18 \div 6 \times (18 - 9 \div 3)$  = \_\_\_\_\_

6.  $(12 \div 2) + (4 \times 3) - 13$  = \_\_\_\_\_

7.  $(14 + 3) - (10 - 2) \div 4$  = \_\_\_\_\_

8.  $(12 \div 2) + (4 \times 3) - 13$  = \_\_\_\_\_

9.  $(5 + 7) \div 2 \div (8 \div 4)$  = \_\_\_\_\_

10.  $(32 - 14) \div (4 + 5) \div 4$  = \_\_\_\_\_

11.  $1 + (9 \times 5) - 12 + (13 - 4)$  = \_\_\_\_\_

12.  $25 \div (2 + 3) - (3 + 5) + 6$  = \_\_\_\_\_

13.  $(15 \div 3) \times 20 \div (10 \div 5) + 8$  = \_\_\_\_\_

14.  $(12 + 14) \div (15 \div 3 + 8) + 33$  = \_\_\_\_\_

15.  $36 \div (3 \times 4) + (2 \times 3) + 16 \times 3 - 2$  = \_\_\_\_\_

16.  $22 \div (14 \div 7) + (5 \times 2) - 3 \times (4 - 1)$  = \_\_\_\_\_

17.  $36 - (3 \times 4) \div (2 \times 3) + 2 \times (5 - 2)$  = \_\_\_\_\_



$$18. \quad 35 \div (3+4) \times 3 - (4 \times 3) \div 4 \times (6-2) = \underline{\hspace{2cm}}$$

$$19. \quad 18 \times (2+6 \div 2) \div 30 + 15 \div (1+4) - 4 = \underline{\hspace{2cm}}$$

$$20. \quad 4 \times [(11+7) \div 3] - 15 \div (7-2) + 6 \times (5-3) + 11 = \underline{\hspace{2cm}}$$

### Practice Section C

Calculate the answer to each of the following questions by performing the correct order of operations.

$$1. \quad (27 \div 3) \times (24 \div 8) \times (16 \div 8) - 7 \times (26 \div 2 - 13) = \underline{\hspace{2cm}}$$

$$2. \quad 5 \times (7 - 2 + 3) \div 8 - 2 \times (21 - 20) + 8 \times (6 - 2) = \underline{\hspace{2cm}}$$

$$3. \quad 2 \times [5 \times (7 - 2 + 3) \div 8] \times (18 + 2 \times 3 - 20) + 8 \times (6 - 2) = \underline{\hspace{2cm}}$$

$$4. \quad 42 \div (7 \times 3) \times (6 - 2) + [44 \div (35 - 13)] + 9 \div (2 + 1) = \underline{\hspace{2cm}}$$

$$5. \quad [2 \times (4 + 11)] \times 6 - 12 \times [5 + (3 \times 9 - 7) \times 2 - 40] - (6 + 7) \times 2 = \underline{\hspace{2cm}}$$

### Practice Section D

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

$$\begin{aligned} 1. \quad & 36 \div (3 \times 4) + (2 \times 3) - 16 \times 3 + 50 \\ & = 12 \times 4 + (2 \times 3) - 16 \times 3 + 50 \\ & = 48 + 6 - 16 \times 3 + 50 \\ & = 54 + 48 + 50 \\ & = 152 \end{aligned}$$



2.

$$\begin{aligned} & 21 \times (4+9) \div 13 + 60 \div (6-1) + 7 \times (4-2) \\ & = 21 \times 13 \div 13 + 60 \div (6-1) + 7 \times (4-2) \\ & = 21 \times 13 \div 13 + 60 \div 5 + 7 \times (4-2) \\ & = 21 \times 13 \div 13 + 60 \div 12 \times (4-2) \\ & = 21 \times 13 \div 13 + 60 \div 12 \times 3 \\ & = 273 \div 13 + 60 \div 12 \times 3 \\ & = 21 + 60 \div 12 \times 3 \\ & = 21 + 5 \times 3 \\ & = 78 \end{aligned}$$

**Practice Section E**

Challenge Question. If you can do this one, then you get an A<sup>+</sup>. 😊

Calculate the answer by performing the correct order of operations.

$$10 \times [5 + (7 \times 2 - 4) \times 6 - 30] + (3 + 7) \times 2 - [4 \times (3 + 12)] \times 6 + [(15 \div 3) \times 20 \div (10 \div 5) + 8]$$

= \_\_\_\_\_



# SOLUTIONS

## Set B

### Order of Operations 2



**ORDER OF OPERATIONS 2****Practice Section A**

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1. Solution:  
 $(9+6)-2$   
 $=15-2$   
 $=13$

2. Solution:  
 $8 \div (2+6)$   
 $=8 \div 8$   
 $=1$

3. Solution:  
 $16 \div (2+6)$   
 $=16 \div 8$   
 $=2$

4. Solution:  
 $(18-6) \div 3$   
 $=12 \div 3$   
 $=4$

5. Solution:  
 $(14-6) \times 2$   
 $=8 \times 2$   
 $=16$

6. Solution:  
 $(13+5) \div 2$   
 $=18 \div 2$   
 $=9$

7. Solution:  
 $(5-2) + (6+2)$   
 $=3+8$   
 $=11$

8. Solution:  
 $6 \times (4-2)$   
 $=6 \times 2$   
 $=12$

9. Solution:  
 $15 \div (3+2)$   
 $=15 \div 5$   
 $=3$

10. Solution:  
 $15 \div (15 \div 3)$   
 $=15 \div 5$   
 $=3$

11. Solution:  
 $18 + 6 \div (2+4)$   
 $=18 + 6 \div 6$   
 $=18 + 1$   
 $=19$

12. Solution:  
 $21 \div (5-2) + 7$   
 $=21 \div 3 + 7$   
 $=7 + 7$   
 $=14$



13. Solution:  
 $(4+8) \div 2 - 6$   
 $= 12 \div 2 - 6$   
 $= 6 - 6$   
 $= 0$

14. Solution:  
 $2 \times (7-2) + 3$   
 $= 2 \times 5 + 3$   
 $= 10 + 3$   
 $= 13$

15. Solution:  
 $(4+8) \div (6-2)$   
 $= 12 \div (6-2)$   
 $= 12 \div 4$   
 $= 3$

### Practice Section B

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1. Solution:  
 $20 \div 4 - (5-2)$   
 $= 5 - (5-2)$   
 $= 5 - 3$   
 $= 2$

2. Solution:  
 $24 \div (24 \div 12) + 4$   
 $= 24 \div 2 + 4$   
 $= 12 + 4$   
 $= 16$

3. Solution:  
 $3 \times 6 + (7-2) + 3$   
 $= 18 + 5 + 3$   
 $= 23 + 3$   
 $= 26$

4. Solution:  
 $(4 \times 2) + (12 \div 3)$   
 $= 8 + 4$   
 $= 12$



5. Solution:  
 $18 \div 6 \times (18 - 9 \div 3)$   
 $= 3 \times (18 - 9 \div 3)$   
 $= 3 \times (18 - 3)$   
 $= 3 \times 15$   
 $= 45$

6. Solution:  
 $(12 \div 2) + (4 \times 3) - 13$   
 $= 6 + (4 \times 3) - 13$   
 $= 6 + 12 - 13$   
 $= 18 - 13$   
 $= 5$

7. Solution:  
 $(14 + 3) - (10 - 2) \div 4$   
 $= 17 - (10 - 2) \div 4$   
 $= 17 - 8 \div 4$   
 $= 17 - 2$   
 $= 15$

8. Solution:  
 $(12 \div 2) + (4 \times 3) - 13$   
 $= 6 + (4 \times 3) - 13$   
 $= 6 + 12 - 13$   
 $= 18 - 13$   
 $= 5$

9. Solution:  
 $(5 + 7) \div 2 \div (8 \div 4)$   
 $= 12 \div 2 \div (8 \div 4)$   
 $= 6 \div (8 \div 4)$   
 $= 6 \div 2$   
 $= 3$

10. Solution:  
 $(32 - 14) \div (4 + 5) \div 4$   
 $= 18 \div (4 + 5) \div 4$   
 $= 18 \div 9 \div 4$   
 $= \frac{1}{2}$

11. Solution:  
 $1 + (9 \times 5) - 12 + (13 - 4)$   
 $= 1 + 45 - 12 + (13 - 4)$   
 $= 1 + 45 - 12 + 9$   
 $= 43$

12. Solution:  
 $25 \div (2 + 3) - (3 + 5) + 6$   
 $= 25 \div 5 - (3 + 5) + 6$   
 $= 5 - (3 + 5) + 6$   
 $= 5 - 8 + 6$   
 $= 3$

13. Solution:  
 $(15 \div 3) \times 20 \div (10 \div 5) + 8$   
 $= 5 \times 20 \div (10 \div 5) + 8$   
 $= 100 \div (10 \div 5) + 8$   
 $= 100 \div 2 + 8$   
 $= 50 + 8$   
 $= 58$

14. Solution:  
 $(12 + 14) \div (15 \div 3 + 8) + 33$   
 $= 26 \div (15 \div 3 + 8) + 33$   
 $= 26 \div (5 + 8) + 33$   
 $= 26 \div 13 + 33$   
 $= 2 + 33$   
 $= 35$



15. Solution:

$$\begin{aligned} & 36 \div (3 \times 4) + (2 \times 3) + 16 \times 3 - 2 \\ & = 36 \div 12 + (2 \times 3) + 16 \times 3 - 2 \\ & = 36 \div 12 + 6 + 16 \times 3 - 2 \\ & = 3 + 6 + 16 \times 3 - 2 \\ & = 3 + 6 + 48 - 2 \\ & = 9 + 48 - 2 \\ & = 57 - 2 \\ & = 55 \end{aligned}$$

16. Solution:

$$\begin{aligned} & 22 \div (14 \div 7) + (5 \times 2) - 3 \times (4 - 1) \\ & = 22 \div 2 + (5 \times 2) - 3 \times (4 - 1) \\ & = 22 \div 2 + 10 - 3 \times (4 - 1) \\ & = 22 \div 2 + 10 - 3 \times 3 \\ & = 11 + 10 - 3 \times 3 \\ & = 11 + 10 - 9 \\ & = 21 - 9 \\ & = 12 \end{aligned}$$

17. Solution:

$$\begin{aligned} & 36 - (3 \times 4) \div (2 \times 3) + 2 \times (5 - 2) \\ & = 36 - 12 \div (2 \times 3) + 2 \times (5 - 2) \\ & = 36 - 12 \div 6 + 2 \times (5 - 2) \\ & = 36 - 12 \div 6 + 2 \times 3 \\ & = 36 - 2 + 2 \times 3 \\ & = 36 - 2 + 6 \\ & = 34 + 6 \\ & = 40 \end{aligned}$$

18. Solution:

$$\begin{aligned} & 35 \div (3 + 4) \times 3 - (4 \times 3) \div 4 \times (6 - 2) \\ & = 35 \div 7 \times 3 - (4 \times 3) \div 4 \times (6 - 2) \\ & = 35 \div 7 \times 3 - 12 \div 4 \times (6 - 2) \\ & = 35 \div 7 \times 3 - 12 \div 4 \times 4 \\ & = 5 \times 3 - 12 \div 4 \times 4 \\ & = 15 - 3 \times 4 \\ & = 15 - 12 \\ & = 3 \end{aligned}$$

19. Solution:

$$\begin{aligned} & 18 \times (2 + 6 \div 2) \div 30 + 15 \div (1 + 4) - 4 \\ & = 18 \times (2 + 3) \div 30 + 15 \div (1 + 4) - 4 \\ & = 18 \times 5 \div 30 + 15 \div (1 + 4) - 4 \\ & = 18 \times 5 \div 30 + 15 \div 5 - 4 \\ & = 90 \div 30 + 15 \div 5 - 4 \\ & = 3 + 15 \div 5 - 4 \\ & = 3 + 3 - 4 \\ & = 6 - 4 \\ & = 2 \end{aligned}$$

20. Solution:

$$\begin{aligned} & 4 \times [(11 + 7) \div 3] - 15 \div (7 - 2) + 6 \times (5 - 3) + 11 \\ & = 4 \times [18 \div 3] - 15 \div (7 - 2) + 6 \times (5 - 3) + 11 \\ & = 4 \times 6 - 15 \div (7 - 2) + 6 \times (5 - 3) + 11 \\ & = 4 \times 6 - 15 \div 5 + 6 \times (5 - 3) + 11 \\ & = 4 \times 6 - 15 \div 5 + 6 \times 2 + 11 \\ & = 24 - 15 \div 5 + 6 \times 2 + 11 \\ & = 24 - 3 + 6 \times 2 + 11 \\ & = 24 - 3 + 12 + 11 \\ & = 21 + 12 + 11 \\ & = 33 + 11 \\ & = 44 \end{aligned}$$

**Practice Section C**

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**1.** Solution:

$$\begin{aligned}(27 \div 3) \times (24 \div 8) \times (16 \div 8) - 7 \times (26 \div 2 - 13) \\ = 9 \times (24 \div 8) \times (16 \div 8) - 7 \times (26 \div 2 - 13) \\ = 9 \times 3 \times (16 \div 8) - 7 \times (26 \div 2 - 13) \\ = 9 \times 3 \times 2 - 7 \times (26 \div 2 - 13) \\ = 9 \times 3 \times 2 - 7 \times (13 - 13) \\ = 9 \times 3 \times 2 - 7 \times 0 \\ = 9 \times 3 \times 2 - 0 \\ = 27 \times 2 \\ = 54\end{aligned}$$

**2.** Solution:

$$\begin{aligned}5 \times (7 - 2 + 3) \div 8 - 2 \times (21 - 20) + 8 \times (6 - 2) \\ = 5 \times (5 + 3) \div 8 - 2 \times (21 - 20) + 8 \times (6 - 2) \\ = 5 \times 8 \div 8 - 2 \times (21 - 20) + 8 \times (6 - 2) \\ = 5 \times 8 \div 8 - 2 \times 1 + 8 \times (6 - 2) \\ = 5 \times 8 \div 8 - 2 \times 1 + 8 \times 4 \\ = 40 \div 8 - 2 \times 1 + 8 \times 4 \\ = 5 - 2 \times 1 + 8 \times 4 \\ = 5 - 2 + 8 \times 4 \\ = 5 - 2 + 12 \\ = 3 + 12 \\ = 15\end{aligned}$$

**3.** Solution:

$$\begin{aligned}2 \times [5 \times (7 - 2 + 3) \div 8] \times (18 + 2 \times 3 - 20) + 8 \times (6 - 2) \\ = 2 \times [5 \times (8) \div 8] \times (18 + 2 \times 3 - 20) + 8 \times (6 - 2) \\ = 2 \times [40 \div 8] \times (18 + 2 \times 3 - 20) + 8 \times (6 - 2) \\ = 2 \times 5 \times (18 + 2 \times 3 - 20) + 8 \times (6 - 2) \\ = 2 \times 5 \times (18 + 6 - 20) + 8 \times (6 - 2) \\ = 2 \times 5 \times 4 + 8 \times (6 - 2) \\ = 2 \times 5 \times 4 + 8 \times 4 \\ = 10 \times 4 + 8 \times 4 \\ = 40 + 8 \times 4 \\ = 40 + 32 \\ = 72\end{aligned}$$

**4.** Solution:

$$\begin{aligned}42 \div (7 \times 3) \times (6 - 2) + [44 \div (35 - 13)] + 9 \div (2 + 1) \\ = 42 \div (7 \times 3) \times (6 - 2) + [44 \div 22] + 9 \div (2 + 1) \\ = 42 \div 21 \times (6 - 2) + [44 \div 22] + 9 \div (2 + 1) \\ = 42 \div 21 \times 4 + [44 \div 22] + 9 \div (2 + 1) \\ = 42 \div 21 \times 4 + 2 + 9 \div (2 + 1) \\ = 42 \div 21 \times 4 + 2 + 9 \div 3 \\ = 2 \times 4 + 2 + 9 \div 3 \\ = 8 + 2 + 9 \div 3 \\ = 8 + 2 + 3 \\ = 13\end{aligned}$$



5. Solution:

$$\begin{aligned} & [2 \times (4 + 11)] \times 6 - 12 \times [5 + (3 \times 9 - 7) \times 2 - 40] - (6 + 7) \times 2 \\ &= [2 \times 15] \times 6 - 12 \times [5 + (3 \times 9 - 7) \times 2 - 40] - (6 + 7) \times 2 \\ &= [2 \times 15] \times 6 - 12 \times [5 + (27 - 7) \times 2 - 40] - (6 + 7) \times 2 \\ &= [2 \times 15] \times 6 - 12 \times [5 + 20 \times 2 - 40] - (6 + 7) \times 2 \\ &= [2 \times 15] \times 6 - 12 \times [5 + 40 - 40] - (6 + 7) \times 2 \\ &= 30 \times 6 - 12 \times [5 + 40 - 40] - (6 + 7) \times 2 \\ &= 30 \times 6 - 12 \times 5 - (6 + 7) \times 2 \\ &= 30 \times 6 - 12 \times 5 - 13 \times 2 \\ &= 180 - 12 \times 5 - 13 \times 2 \\ &= 180 - 60 - 13 \times 2 \\ &= 180 - 60 - 26 \\ &= 120 - 26 \\ &= 94 \end{aligned}$$

### Practice Section D

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1. Solution:

There is an error in line 1 when  $36 \div 3$  is calculated before  $3 \times 4$ . A second error is made in the last line when  $54 + 48 + 50 = 152$  appears instead of  $54 - 48 + 50 = 56$ .

The correct solution is:

$$\begin{aligned} & 36 \div (3 \times 4) + (2 \times 3) - 16 \times 3 + 50 \\ &= 36 \div 12 + (2 \times 3) - 16 \times 3 + 50 \\ &= 36 \div 12 + 6 - 16 \times 3 + 50 \\ &= 3 + 6 - 16 \times 3 + 50 \\ &= 3 + 6 - 48 + 50 \\ &= 9 - 48 + 50 \\ &= 11 \end{aligned}$$

**2. Solution:**

The incorrect order of operations is performed line 4 since  $5 + 7$  is calculated before  $15 \div 5$ . There is arithmetic error in line 5 when  $4 - 2 = 3$  instead of  $4 - 2 = 2$ . The last error is in line 8 when the incorrect order of operations is performed as  $21 + 5$  is calculated before  $5 \times 3$ .

The correct solution is:

$$\begin{aligned} & 21 \times (4 + 9) \div 13 + 60 \div (6 - 1) + 7 \times (4 - 2) \\ & = 21 \times 13 \div 13 + 60 \div (6 - 1) + 7 \times (4 - 2) \\ & = 21 \times 13 \div 13 + 60 \div 5 + 7 \times (4 - 2) \\ & = 21 \times 13 \div 13 + 60 \div 5 + 7 \times 2 \\ & = 21 \times 13 \div 13 + 60 \div 5 + 14 \\ & = 273 \div 13 + 60 \div 5 + 14 \\ & = 21 + 60 \div 5 + 14 \\ & = 21 + 12 + 14 \\ & = 47 \end{aligned}$$

**Practice Section E**

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Solution:

$$\begin{aligned} & 10 \times [5 + (7 \times 2 - 4) \times 6 - 30] + (3 + 7) \times 2 - [4 \times (3 + 12)] \times 6 + [(15 \div 3) \times 20 \div (10 \div 5) + 8] \\ &= 10 \times [5 + (14 - 4) \times 6 - 30] + (3 + 7) \times 2 - [4 \times (3 + 12)] \times 6 + [(15 \div 3) \times 20 \div (10 \div 5) + 8] \\ &= 10 \times [5 + 10 \times 6 - 30] + (3 + 7) \times 2 - [4 \times (3 + 12)] \times 6 + [(15 \div 3) \times 20 \div (10 \div 5) + 8] \\ &= 10 \times [5 + 10 \times 6 - 30] + (3 + 7) \times 2 - [4 \times 15] \times 6 + [(15 \div 3) \times 20 \div (10 \div 5) + 8] \\ &= 10 \times [5 + 10 \times 6 - 30] + (3 + 7) \times 2 - [4 \times 15] \times 6 + [5 \times 20 \div (10 \div 5) + 8] \\ &= 10 \times [5 + 10 \times 6 - 30] + (3 + 7) \times 2 - [4 \times 15] \times 6 + [5 \times 20 \div 2 + 8] \\ &= 10 \times [5 + 10 \times 6 - 30] + (3 + 7) \times 2 - [4 \times 15] \times 6 + [100 \div 2 + 8] \\ &= 10 \times [5 + 10 \times 6 - 30] + (3 + 7) \times 2 - [4 \times 15] \times 6 + [50 + 8] \\ &= 10 \times [5 + 10 \times 6 - 30] + (3 + 7) \times 2 - [4 \times 15] \times 6 + 58 \\ &= 10 \times [5 + 60 - 30] + (3 + 7) \times 2 - [4 \times 15] \times 6 + 58 \\ &= 10 \times 35 + (3 + 7) \times 2 - [4 \times 15] \times 6 + 58 \\ &= 10 \times 35 + 10 \times 2 - [4 \times 15] \times 6 + 58 \\ &= 10 \times 35 + 10 \times 2 - 60 \times 6 + 58 \\ &= 350 + 10 \times 2 - 60 \times 6 + 58 \\ &= 350 + 20 - 60 \times 6 + 58 \\ &= 350 + 20 - 360 + 58 \\ &= 370 - 360 + 58 \\ &= 10 + 58 \\ &= 68 \end{aligned}$$