

## Homework without the hassle

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## Order of Operations - Year 6

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# ORDER OF OPERATIONS AT A GLANCE

Use the same priority every time.

1

## BRACKETS

Work inside  
grouping symbols first.

( )

2

## ORDERS

Calculate powers  
and exponents

3

## DIVIDE & MULTIPLY

Work from left to right.

$\div$   $\times$

4

## ADD & SUBTRACT

Work from left to right.

$+$   $-$

1-2-3-4

BODMAS and PEMDAS  
less the same order.

When operations have  
equal priority, move from  
left to right.

## EXAMPLE

$$\begin{aligned} 18 + 3 \times 8 \\ = 18 + 24 \\ = 42 \end{aligned}$$

Multiply before adding.

1

2

3

4

+

-

$\times$

$\div$

# BODMAS + PEMDAS

Two names. One reliable order.

## BODMAS

**B**

Brackets

**O**

Orders

**D**

Division

**M**

Multiplication

**A**

Addition

**S**

Subtraction

## PEMDAS

**P**

Parentheses

**E**

Exponents

**M**

Multiplication

**D**

Division

**A**

Addition

**S**

Subtraction

Division and multiplication share a priority.

Addition and subtraction share a priority.

For equal-priority operations, work from left to right.

## QUICK CHECK

**1** Brackets • **2** Orders • **3** ÷ and × • **4** + and –

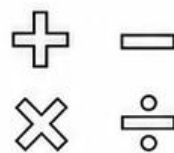
$$24 \div 6 \times 3 = 4 \times 3 = 12$$

NAME \_\_\_\_\_

DATE \_\_\_\_\_

 $( [ ] )$ 

# SOLVE IN SEQUENCE



Page 1 — Follow the order of operations.

Evaluate each expression. Show the step that proves which operation you completed first.

1.  $15 + 4 \times 6$

---

---

Answer: \_\_\_\_\_

2.  $(15 + 4) \times 6$

---

---

Answer: \_\_\_\_\_

3.  $72 \div 8 + 9$

---

---

Answer: \_\_\_\_\_

4.  $72 \div (8 + 1)$

---

---

Answer: \_\_\_\_\_

5.  $6^2 - 5 \times 4$

---

---

Answer: \_\_\_\_\_

6.  $48 \div 6 \times 2$

---

---

Answer: \_\_\_\_\_

7.  $90 - 24 \div 3$

---

---

Answer: \_\_\_\_\_

8.  $(90 - 24) \div 6$

---

---

Answer: \_\_\_\_\_

9.  $7 + 3 \times (12 - 8)$

---

---

Answer: \_\_\_\_\_

10.  $(7 + 3) \times (12 - 8)$

---

---

Answer: \_\_\_\_\_

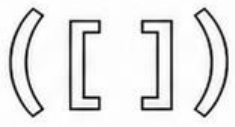
 $( [ ] )$ **REMEMBER**

Equal-priority operations are completed from left to right.

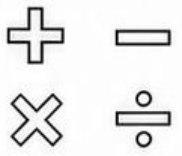


NAME \_\_\_\_\_

DATE \_\_\_\_\_



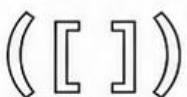
# SOLVE IN SEQUENCE



Page 1 — Follow the order of operations. **ANSWERS**

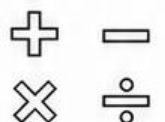
Evaluate each expression. Show the step that proves which operation you completed first.

|                                                                                                                                       |                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <p>1. <math>15 + 4 \times 6</math></p> <p><math>15 + 24 = 39</math></p> <p>Answer: <u>39</u></p>                                      | <p>2. <math>(15 + 4) \times 6</math></p> <p><math>19 \times 6 = 114</math></p> <p>Answer: <u>114</u></p>      |
| <p>3. <math>72 \div 8 + 9</math></p> <p><math>9 + 9 = 18</math></p> <p>Answer: <u>18</u></p>                                          | <p>4. <math>72 \div (8 + 1)</math></p> <p><math>72 \div 9 = 8</math></p> <p>Answer: <u>8</u></p>              |
| <p>5. <math>6^2 - 5 \times 4</math></p> <p><math>36 - 20 = 16</math></p> <p>Answer: <u>16</u></p>                                     | <p>6. <math>48 \div 6 \times 2</math></p> <p><math>8 \times 2 = 16</math></p> <p>Answer: <u>16</u></p>        |
| <p>7. <math>90 - 24 \div 3</math></p> <p><math>90 - 8 = 82</math></p> <p>Answer: <u>82</u></p>                                        | <p>8. <math>(90 - 24) \div 6</math></p> <p><math>66 \div 6 = 11</math></p> <p>Answer: <u>11</u></p>           |
| <p>9. <math>7 + 3 \times (12 - 8)</math></p> <p><math>7 + 3 \times 4</math><br/><math>7 + 12 = 19</math></p> <p>Answer: <u>19</u></p> | <p>10. <math>(7 + 3) \times (12 - 8)</math></p> <p><math>10 \times 4 = 40</math></p> <p>Answer: <u>40</u></p> |



## REMEMBER

Equal-priority operations are completed from left to right.



# SOLVE IN SEQUENCE

Page 2 — Model real situations with expressions.

Write or check the expression, then evaluate it. Show your working.

## 1. CANTEEN TRAYS

Eight trays each hold 24 sandwiches. Another 16 sandwiches are shared equally among the eight trays. How many sandwiches are on each tray?

Expression:  $(8 \times 24 + 16) \div 8$

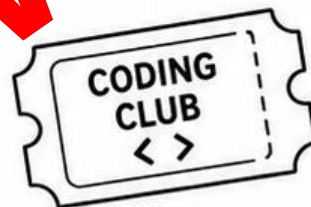


Answer: \_\_\_\_\_

## 2. CODING CLUB

Five teams each earn 18 points. A 14-point penalty is then applied. What is the final score?

Expression:  $5 \times 18 - 14$

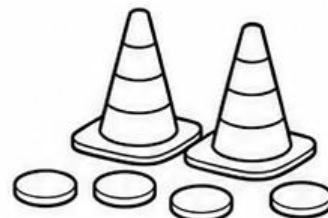


Answer: \_\_\_\_\_

## 3. SPORTS DAY

Six classes collect 27 tokens each. Another 18 tokens are added, then all tokens are shared equally among nine stations. How many tokens does each station receive?

Expression:  $(6 \times 27 + 18) \div 9$



Answer: \_\_\_\_\_

## 4. ERROR ANALYSIS

Mia says  $36 \div 6 \times 3 = 2$  because she multiplied  $6 \times 3$  first.

Is Mia correct? Explain the left-to-right rule and give the correct value.



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# SOLVE IN SEQUENCE

Page 2 — Model real situations with expressions. **ANSWERS**

Write or check the expression, then evaluate it. Show your working.

## 1. CANTEEN TRAYS

Eight trays each hold 24 sandwiches. Another 16 sandwiches are shared equally among the eight trays. How many sandwiches are on each tray?

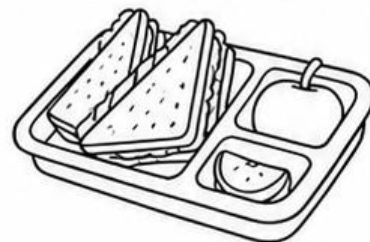
Expression:  $(8 \times 24 + 16) \div 8$

$$8 \times 24 = 192$$

$$192 + 16 = 208$$

$$208 \div 8 = 26$$

Answer: 26 sandwiches



## 2. CODING CLUB

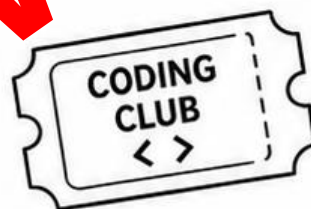
Five teams each earn 18 points. A 14-point penalty is then applied. What is the final score?

Expression:  $5 \times 18 - 14$

$$5 \times 18 = 90$$

$$90 - 14 = 76$$

Answer: 76 points



## 3. SPORTS DAY

Six classes collect 27 tokens each. Another 18 tokens are added, then all tokens are shared equally among nine stations. How many tokens does each station receive?

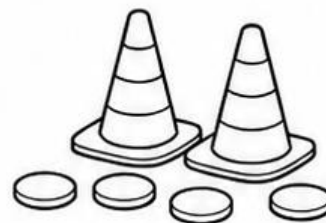
Expression:  $(6 \times 27 + 18) \div 9$

$$6 \times 27 = 162$$

$$162 + 18 = 180$$

$$180 \div 9 = 20$$

Answer: 20 tokens



## 4. ERROR ANALYSIS

Mia says  $36 \div 6 \times 3 = 2$  because she multiplied  $6 \times 3$  first.

Is Mia correct? Explain the left-to-right rule and give the correct value.

No. Division and multiplication have equal priority, so work from left to right.

$36 \div 6 = 6$ , then  $6 \times 3 = 18$ .

Correct value: 18





# BRACKETS CHANGE THE RESULT



Page 1 — Insert one pair of brackets.

Insert one pair of brackets into each expression so the equation becomes true.

1.

$$6 + 4 \times 5 = 50$$

With brackets: \_\_\_\_\_

2.

$$18 - 6 \div 3 = 4$$

With brackets: \_\_\_\_\_

3.

$$8 + 2 \times 7 = 70$$

With brackets: \_\_\_\_\_

4.

$$24 \div 4 + 2 = 4$$

With brackets: \_\_\_\_\_

5.

$$5 \times 9 - 3 = 30$$

With brackets: \_\_\_\_\_

6.

$$7 + 5 \times 4 = 48$$

With brackets: \_\_\_\_\_

7.

$$40 - 16 \div 4 = 6$$

With brackets: \_\_\_\_\_

8.

$$9 - 3 \times 2 = 12$$

With brackets: \_\_\_\_\_

Which bracket placement changed the value most? Explain why.

---

---

---



# BRACKETS CHANGE THE RESULT



Page 1 — Insert one pair of brackets. **ANSWERS**

Insert one pair of brackets into each expression so the equation becomes true.

1.

$$6 + 4 \times 5 = 50$$

With brackets:  $(6 + 4) \times 5 = 50$

2.

$$18 - 6 \div 3 = 4$$

With brackets:  $(18 - 6) \div 3 = 4$

3.

$$8 + 2 \times 7 = 70$$

With brackets:  $(8 + 2) \times 7 = 70$

4.

$$24 \div 4 + 2 = 4$$

With brackets:  $24 \div (4 + 2) = 4$

5.

$$5 \times 9 - 3 = 30$$

With brackets:  $5 \times (9 - 3) = 30$

6.

$$7 + 5 \times 4 = 48$$

With brackets:  $(7 + 5) \times 4 = 48$

7.

$$40 - 16 \div 4 = 6$$

With brackets:  $(40 - 16) \div 4 = 6$

8.

$$9 - 3 \times 2 = 12$$

With brackets:  $(9 - 3) \times 2 = 12$

Which bracket placement changed the value most? Explain why.

Answers will vary. Example: Question 3 changes  $8 + 14 = 22$  to 70, a difference of 48.

# BRACKETS CHANGE THE RESULT

Page 2 — Build each target.

2

3

4

6

For each target, use 2, 3, 4 and 6 exactly once. You may use +, −, ×, ÷ and brackets.

1. TARGET 10

Expression: \_\_\_\_\_

Check: \_\_\_\_\_

2. TARGET 12

Expression: \_\_\_\_\_

Check: \_\_\_\_\_

3. TARGET 18

Expression: \_\_\_\_\_

Check: \_\_\_\_\_

4. TARGET 24

Expression: \_\_\_\_\_

Check: \_\_\_\_\_

5. TARGET 30

Expression: \_\_\_\_\_

Check: \_\_\_\_\_

6. TARGET 36

Expression: \_\_\_\_\_

Check: \_\_\_\_\_

CHALLENGE

Choose one target and find a second, different expression.

\_\_\_\_\_

\_\_\_\_\_

NAME \_\_\_\_\_

DATE \_\_\_\_\_

# BRACKETS CHANGE THE RESULT

Page 2 — Build each target. **ANSWERS****2****3****4****6**

For each target, use 2, 3, 4 and 6 exactly once. You may use +, −, ×, ÷ and brackets.

**1. TARGET 10**Expression:  $6 + 4 \times (3 - 2) = 10$ Check:  $3 - 2 = 1; 4 \times 1 = 4; 6 + 4 = 10$ **2. TARGET 12**Expression:  $(6 - 4 + 2) \times 3 = 12$ Check:  $6 - 4 + 2 = 4; 4 \times 3 = 12$ **3. TARGET 18**Expression:  $6 \times 4 - 3 \times 2 = 18$ Check:  $24 - 6 = 18$ **4. TARGET 24**Expression:  $6 \times 4 \times (3 - 2) = 24$ Check:  $3 - 2 = 1; 6 \times 4 \times 1 = 24$ **5. TARGET 30**Expression:  $6 \times (4 + 3 - 2) = 30$ Check:  $4 + 3 - 2 = 5; 6 \times 5 = 30$ **6. TARGET 36**Expression:  $6 \times 3 \times (4 - 2) = 36$ Check:  $18 \times 2 = 36$ **CHALLENGE**

Choose one target and find a second, different expression.

**Answers will vary. Example for 24:  $(6 + 4 - 2) \times 3 = 24$**



# EQUIVALENT EXPRESSION BUILDER



Different expressions can have the same value.



## A. FIND THE MISSING NUMBER

Write the number that makes each equation true.

1.  $6 + 3 \times \square = 15$

4.  $5 \times \square + 2 = 50$

2.  $(10 - \square) \times 4 = 32$

5.  $2^3 + \square \times 3 = 26$

3.  $48 \div 6 + \square = 15$

6.  $(\square + \square) \div 2 = 8$

## B. MATCH THE EQUIVALENT EXPRESSIONS

Draw a line between expressions with the same value.

A.  $3 \times (8 + 2)$

E.  $(7 + 5) \times 4$

B.  $40 - 5 \times 2$

F.  $60 - 12$

C.  $(18 \div 3) + 7$

G.  $9 + 3 \times 4$

D.  $5 + 16 \div 2$

H.  $42 \div 2$

## C. CREATE YOUR OWN

Create an expression equal to 24 that uses brackets and at least two operations.

Expression: \_\_\_\_\_

Proof: \_\_\_\_\_

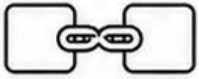
\_\_\_\_\_



# EQUIVALENT EXPRESSION BUILDER



Different expressions can have the same value.



## ANSWERS



### A. FIND THE MISSING NUMBER

Write the number that makes each equation true.

1.  $6 + 3 \times \boxed{3} = 15$  ✓

4.  $5 \times \boxed{8} + 2 = 50$  ✓

2.  $(10 - \boxed{2}) \times 4 = 32$  ✓

5.  $2^3 + \boxed{6} \times 3 = 26$  ✓

3.  $48 \div 6 + \boxed{7} = 15$  ✓

6.  $(\boxed{12} + 4) \div 2 = 8$  ✓

### B. MATCH THE EQUIVALENT EXPRESSIONS

Draw a line between expressions with the same value.

A.  $3 \times (8 + 2) = 30$

E.  $(7 + 5) \times 4 = 48$

B.  $40 - 5 \times 2 = 30$

F.  $60 - 12 = 48$

C.  $(18 \div 3) + 7 = 13$

G.  $9 + 3 \times 4 = 21$

D.  $5 + 16 \div 2 = 13$

H.  $42 \div 2 = 21$

### C. CREATE YOUR OWN

Create an expression equal to 24 that uses brackets and at least two operations.

Expression:  $(8 - 2) \times (3 + 1) = 24$

Proof:  $6 \times 4 = 24$

NAME \_\_\_\_\_

DATE \_\_\_\_\_



# MISSING NUMBER DETECTIVE

Use the result to uncover the unknown.



Find the value of each  $\square$ . Record a check that proves your answer.

1.  $\square + 3 \times 5 = 20$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

2.  $(\square + 2) \times 4 = 32$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

3.  $42 \div \square + 5 = 12$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

4.  $48 \div (\square + 2) = 6$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

5.  $3^2 + \square \times 2 = 19$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

6.  $14 - 8 + \square = 16$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

7.  $7 \times \square - 4 = 17$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

8.  $(15 - \square) \times 2 = 24$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

9.  $72 \div \square + 1 = 10$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

10.  $5 \times (\square - 2) = 20$

$\square =$  \_\_\_\_\_

Check: \_\_\_\_\_

## DETECTIVE NOTES

Explain how you found the unknown in Question 4.

\_\_\_\_\_

Explain how you found the unknown in Question 8.

\_\_\_\_\_



# MISSING NUMBER DETECTIVE



Use the result to uncover the unknown.

## ANSWERS

Find the value of each  $\square$ . Record a check that proves your answer.

|                                                                                                                               |                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. <math>\square + 3 \times 5 = 20</math></p> <p><math>\square = 5</math></p> <p>Check: <math>5 + 15 = 20</math></p>       | <p>2. <math>(\square + 2) \times 4 = 32</math></p> <p><math>\square = 6</math></p> <p>Check: <math>(6 + 2) \times 4 = 32</math></p>   |
| <p>3. <math>42 \div \square + 5 = 12</math></p> <p><math>\square = 6</math></p> <p>Check: <math>42 \div 6 + 5 = 12</math></p> | <p>4. <math>48 \div (\square + 2) = 6</math></p> <p><math>\square = 6</math></p> <p>Check: <math>48 \div (6 + 2) = 6</math></p>       |
| <p>5. <math>3^2 + \square \times 2 = 19</math></p> <p><math>\square = 5</math></p> <p>Check: <math>9 + 10 = 19</math></p>     | <p>6. <math>64 \div 8 + \square = 16</math></p> <p><math>\square = 8</math></p> <p>Check: <math>8 + 8 = 16</math></p>                 |
| <p>7. <math>7 \times \square - 4 = 17</math></p> <p><math>\square = 3</math></p> <p>Check: <math>21 - 4 = 17</math></p>       | <p>8. <math>(15 - \square) \times 2 = 24</math></p> <p><math>\square = 3</math></p> <p>Check: <math>(15 - 3) \times 2 = 24</math></p> |
| <p>9. <math>72 \div \square + 1 = 10</math></p> <p><math>\square = 8</math></p> <p>Check: <math>72 \div 8 + 1 = 10</math></p> | <p>10. <math>5 \times (\square - 2) = 20</math></p> <p><math>\square = 6</math></p> <p>Check: <math>5 \times (6 - 2) = 20</math></p>  |

### DETECTIVE NOTES

Explain how you found the unknown in Question 4.

$48 \div 8 = 6$ , so  $\square + 2 = 8$  and  $\square = 6$ .

Explain how you found the unknown in Question 8.

$24 \div 2 = 12$ , so  $15 - \square = 12$  and  $\square = 3$ .



# OPERATION CODEBREAKER



Solve each expression to reveal the secret message.

Solve each expression. Use the Decoder Key to turn each value into a letter.

| DECODER KEY |        |        |        |        |        |        |        |
|-------------|--------|--------|--------|--------|--------|--------|--------|
| 9 = A       | 12 = D | 20 = E | 24 = M | 15 = O | 18 = R | 14 = S | 30 = T |

|                                                                                                             |                                                                                                             |                                                                                                              |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <div>1. <math>3 + 4 \times 3</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div>   | <div>2. <math>(8 + 1) \times 2</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div> | <div>3. <math>48 \div 4</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div>         |
| <div>4. <math>5 \times (6 - 2)</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div> | <div>5. <math>6^2 \div 2</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div>       | <div>6. <math>3 \times (10 - 2)</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div> |
| <div>7. <math>18 \div 2</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div>        | <div>8. <math>(7 + 3) \times 3</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div> | <div>9. <math>42 - 3 \times 4</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div>   |
| <div>10. <math>64 \div 4 + 4</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div>   | <div>11. <math>50 - 8 \times 4</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div> | <div>12. <math>(9 + 5) \times 1</math></div> <div>Value: _____</div> <div>Letter: <input type="text"/></div> |

## SECRET MESSAGE

|                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|

NAME \_\_\_\_\_

DATE \_\_\_\_\_



# OPERATION CODEBREAKER



Solve each expression to reveal the secret message. **ANSWERS**

Solve each expression. Use the Decoder Key to turn each value into a letter.

## DECODER KEY

9 = A

12 = D

20 = E

24 = M

15 = O

18 = R

14 = S

30 = T

1.  $3 + 4 \times 3$

Value: 15

Letter:

**O**

2.  $(8 + 1) \times 2$

Value: 18

Letter:

**R**

3.  $48 \div 4$

Value: 12

Letter:

**D**

4.  $5 \times (6 - 2)$

Value: 20

Letter:

**E**

5.  $6^2 \div 2$

Value: 18

Letter:

**R**

6.  $3 \times (10 - 2)$

Value: 24

Letter:

**M**

7.  $18 \div 2$

Value: 9

Letter:

**A**

8.  $(7 + 3) \times 3$

Value: 30

Letter:

**T**

9.  $42 - 3 \times 4$

Value: 30

Letter:

**T**

10.  $64 \div 4 + 4$

Value: 20

Letter:

**E**

11.  $50 - 8 \times 4$

Value: 18

Letter:

**R**

12.  $(9 + 5) \times 1$

Value: 14

Letter:

**S**

## SECRET MESSAGE

**O****R****D****E****R****M****A****T****T****E****S**

# TARGET TOTAL CHALLENGE

Solve accurately. Claim the path.



+

×

−

÷

( )

START

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

FINISH

## RULES

1. Place counters on START.
2. Take a card and solve the expression.
3. A correct answer moves you forward 2 spaces.
4. An incorrect answer moves you forward 1 space.
5. First to FINISH wins.

## CHECK IT

Explain which operation you completed first.

[ ]



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# TARGET TOTAL CHALLENGE



Expression Cards — cut along the dashed lines.

$$6 + 4 \times 3$$

TARGET 18

$$(6 + 4) \times 3$$

TARGET 30

$$48 \div 6 + 5$$

TARGET 13

$$48 \div (6 + 2)$$

TARGET 6

$$3^2 + 7$$

TARGET 16

$$5 \times (9 - 4)$$

TARGET 25

$$72 \div 8 \times 3$$

TARGET 27

$$40 - 12 \div 3$$

TARGET 36

$$(40 - 12) \div 4$$

TARGET 7

$$4 \times 6 - 2$$

TARGET 22

$$63 \div 7 + 2$$

TARGET 11

$$(7 + 8) \times 1$$

TARGET 15

$$5 + 9 \times 3$$

TARGET 32

$$3 \times (8 - 4)$$

TARGET 12

$$(14 + 6) \div 1$$

TARGET 20

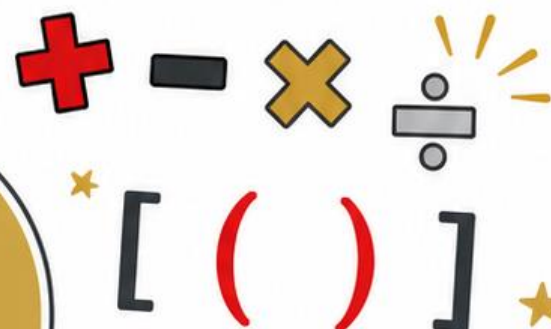
$$9 \times 5 - 3$$

TARGET 42

PREVIEW

# EQUATION PATHWAY RACE

Choose the correct value and race to the finish.



## RULES

1. Place counters on START.
2. Draw a question card.
3. Choose A, B, C or D.
4. A correct answer moves you 3 spaces.
5. An incorrect answer moves you 1 space.
6. First to FINISH wins.

## MATHS TALK

Name the operation you completed first.



# EQUATION PATHWAY RACE



Question Cards — cut along the dashed lines.



**1.**  $14 + 6 \times 3$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 60 | <b>B</b> | 32 |
| <b>C</b> | 24 | <b>D</b> | 20 |

**2.**  $(14 + 6) \times 3$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 32 | <b>B</b> | 17 |
| <b>C</b> | 60 | <b>D</b> | 54 |

**3.**  $54 \div 9 + 7$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 13 | <b>B</b> | 6  |
| <b>C</b> | 12 | <b>D</b> | 61 |

**4.**  $54 \div (9 - 3)$

- |          |   |          |    |
|----------|---|----------|----|
| <b>A</b> | 6 | <b>B</b> | 12 |
| <b>C</b> | 9 | <b>D</b> | 18 |

**5.**  $2^3 + 5 \times 2$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 20 | <b>B</b> | 18 |
| <b>C</b> | 13 | <b>D</b> | 30 |

**6.**  $5 \times (12 - 7) + 4$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 45 | <b>B</b> | 25 |
| <b>C</b> | 29 | <b>D</b> | 49 |

**7.**  $36 \div 6 \times 4$

- |          |   |          |    |
|----------|---|----------|----|
| <b>A</b> | 2 | <b>B</b> | 24 |
| <b>C</b> | 6 | <b>D</b> | 18 |

**8.**  $36 \div (6 \times 3)$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 6  | <b>B</b> | 12 |
| <b>C</b> | 18 | <b>D</b> | 2  |

**9.**  $50 - 18 \div 3$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 44 | <b>B</b> | 10 |
| <b>C</b> | 32 | <b>D</b> | 14 |

**10.**  $(50 - 18) \div 4$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 44 | <b>B</b> | 8  |
| <b>C</b> | 17 | <b>D</b> | 32 |

**11.**  $7 + 3 \times (9 - 5)$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 40 | <b>B</b> | 31 |
| <b>C</b> | 19 | <b>D</b> | 12 |

**12.**  $(7 + 3) \times (9 - 5)$

- |          |    |          |    |
|----------|----|----------|----|
| <b>A</b> | 19 | <b>B</b> | 12 |
| <b>C</b> | 50 | <b>D</b> | 40 |

# EQUATION PATHWAY RACE



## Answer Key



**1**

Choice: **B**

Expression:  $14 + 6 \times 3$

Evaluation: **32**

**7**

Choice: **B**

Expression:  $36 \div 6 \times 4$

Evaluation: **24**

**2**

Choice: **C**

Expression:  $(14 + 6) \times 3$

Evaluation: **60**

**8**

Choice: **D**

Expression:  $36 \div (6 \times 3)$

Evaluation: **2**

**3**

Choice: **A**

Expression:  $54 \div 9 + 7$

Evaluation: **13**

**9**

Choice: **A**

Expression:  $50 - 18 \div 3$

Evaluation: **44**

**4**

Choice: **C**

Expression:  $54 \div (5 - 3)$

Evaluation: **9**

**10**

Choice: **B**

Expression:  $(50 - 18) \div 4$

Evaluation: **8**

**5**

Choice: **B**

Expression:  $2^3 + 5 \times 2$

Evaluation: **18**

**11**

Choice: **C**

Expression:  $7 + 3 \times (9 - 5)$

Evaluation: **19**

**6**

Choice: **C**

Expression:  $5 \times (12 - 7) + 4$

Evaluation: **29**

**12**

Choice: **D**

Expression:  $(7 + 3) \times (9 - 5)$

Evaluation: **40**



## REMEMBER

Complete equal-priority operations from left to right.

# ORDER OF OPERATIONS MASTERY CHECK

Page 1



Show your working. Apply the order of operations carefully.

|    |                                                                                                                                                               |                                                             |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| 1. | Evaluate: $16 + 5 \times 4$                                                                                                                                   | <div></div> <div></div> <div>Answer: <div></div></div>      |
| 2. | Evaluate: $(16 + 5) \times 4$                                                                                                                                 | <div></div> <div></div> <div>Answer: <div></div></div>      |
| 3. | Evaluate: $64 \div 8 + 11$                                                                                                                                    | <div></div> <div></div> <div>Answer: <div></div></div>      |
| 4. | Evaluate: $3^2 + 6 \times 2$                                                                                                                                  | <div></div> <div></div> <div>Answer: <div></div></div>      |
| 5. | Evaluate: $48 \div 6 - 4$                                                                                                                                     | <div></div> <div></div> <div>Answer: <div></div></div>      |
| 6. | Evaluate: $70 - 18 \div 3$                                                                                                                                    | <div></div> <div></div> <div>Answer: <div></div></div>      |
| 7. | Insert one pair of brackets to make this true:<br>$9 + 3 \times 5 = 60$                                                                                       | <div></div> <div></div> <div>Answer: <div></div></div>      |
| 8. | A student says $24 \div 6 \times 2 = 2$ because $6 \times 2$ was completed first.<br><br>Is the student correct? Explain the rule and give the correct value. | <div></div> <div></div> <div></div> <div></div> <div></div> |

Check that equal-priority operations were completed from left to right.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

TEACHER \_\_\_\_\_

**ORDER OF OPERATIONS MASTERY CHECK – ANSWERS**

Page 1



Show your working. Apply the order of operations carefully.

|    |                                                                                                                                                               |                                                                                                                                                                 |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Evaluate: $16 + 5 \times 4$                                                                                                                                   | $5 \times 4 = 20; 16 + 20 = 36$<br>Answer: <u>36</u>                                                                                                            |
| 2. | Evaluate: $(16 + 5) \times 4$                                                                                                                                 | $16 + 5 = 21; 21 \times 4 = 84$<br>Answer: <u>84</u>                                                                                                            |
| 3. | Evaluate: $64 \div 8 + 11$                                                                                                                                    | $64 \div 8 = 8; 8 + 11 = 19$<br>Answer: <u>19</u>                                                                                                               |
| 4. | Evaluate: $3^2 + 6 \times 2$                                                                                                                                  | $3^2 = 9; 6 \times 2 = 12; 9 + 12 = 21$<br>Answer: <u>21</u>                                                                                                    |
| 5. | Evaluate: $48 \div 6 \times 4$                                                                                                                                | $48 \div 6 = 8; 8 \times 4 = 32$<br>Answer: <u>32</u>                                                                                                           |
| 6. | Evaluate: $70 - 18 \div 3$                                                                                                                                    | $18 \div 3 = 6; 70 - 6 = 64$<br>Answer: <u>64</u>                                                                                                               |
| 7. | Insert one pair of brackets to make this true:<br>$9 + 3 \times 5 = 60$                                                                                       | $(9 + 3) \times 5 = 60$<br>Answer: <u><math>(9 + 3) \times 5 = 60</math></u>                                                                                    |
| 8. | A student says $24 \div 6 \times 2 = 2$ because $6 \times 2$ was completed first.<br><br>Is the student correct? Explain the rule and give the correct value. | <i>No. Division and multiplication have equal priority, so work from left to right.</i><br>$24 \div 6 = 4$ , then $4 \times 2 = 8$ .<br><i>Correct value: 8</i> |

Check that equal-priority operations were completed from left to right.

# ORDER OF OPERATIONS MASTERY CHECK

Page 2

Show your reasoning. Use an expression whenever the question asks for one.



9. Which expression is equivalent to  $4 \times (7 + 2)$ ?

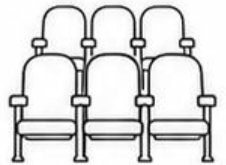
- ☐ A.  $4 \times 7 + 2$   
☐ B.  $4 \times 7 + 4 \times 2$   
☐ C.  $(4 \times 7) + 2^2$   
☐ D.  $4 \times (7 \times 2)$

10. Find the missing number:

$$(\square + 4) \times 3 = 30$$

Answer: \_\_\_\_\_

11. A theatre has seven rows of 24 seats and 12 balcony seats. All seats are shared equally among six seating zones. Write and evaluate one expression to find the number of seats in each zone.



Answer: \_\_\_\_\_

12. Use 2, 5, 6 and 8 exactly once to write an expression equal to 36. You may use  $+$ ,  $-$ ,  $\times$ ,  $\div$  and brackets.

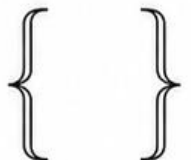
Answer: \_\_\_\_\_

13. A student evaluates  $50 - 18 \div 3$  as 32 by subtracting first. Explain the error and give the correct value.

Answer: \_\_\_\_\_

## 14. CHALLENGE

Evaluate:  $2^3 + (18 - 6) \div 3 \times 2$



Answer: \_\_\_\_\_

# ORDER OF OPERATIONS MASTERY CHECK

## Page 2 ANSWERS

Show your reasoning. Use an expression whenever the question asks for one.



9. Which expression is equivalent to  $4 \times (7 + 2)$ ?

- ☐ A.  $4 \times 7 + 2$
- ☒ B.  $4 \times 7 + 4 \times 2$
- ☐ C.  $(4 \times 7) + 2^2$
- ☐ D.  $4 \times (7 \times 2)$

10. Find the missing number:

$$(\square + 4) \times 3 = 30$$

$$\square = 6$$

$$(6 + 4) \times 3 = 30$$

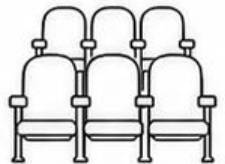
Answer: 6

11. A theatre has seven rows of 24 seats and 12 balcony seats. All seats are shared equally among six seating zones. Write and evaluate one expression to find the number of seats in each zone.

$$(7 \times 24 + 12) \div 6$$

$$= (168 + 12) \div 6$$

$$= 180 \div 6 = 30$$



Answer: 30 seats

12. Use 2, 5, 6 and 8 exactly once to write an expression equal to 36. You may use +, -,  $\times$ ,  $\div$  and brackets.

$$6 \times 5 + 8 - 2 = 36$$

$$30 + 8 - 2 = 36$$

Answer: Answers will vary; one solution is shown.

13. A student evaluates  $50 - 18 \div 3$  as 32 by subtracting first. Explain the error and give the correct value.

Division is completed before subtraction.

$$18 \div 3 = 6; 50 - 6 = 44$$

Answer: 44

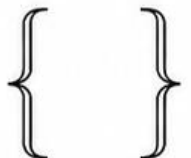
14. CHALLENGE

Evaluate:  $2^3 + (18 - 6) \div 3 \times 2$

$$18 - 6 = 12; 12 \div 3 = 4; 4 \times 2 = 8; 2^3 = 8$$

$$8 + 8 = 16$$

Answer: 16



# ORDER OF OPERATIONS — LEARNING RUBRIC

Use evidence from the mastery check, worksheets and mathematical explanations.

STUDENT \_\_\_\_\_ DATE \_\_\_\_\_

TEACHER \_\_\_\_\_

| CRITERIA               | BEGINNING                                    | DEVELOPING                               | ACHIEVING                                          | CONFIDENT                                          | EXCEEDING                                                  |
|------------------------|----------------------------------------------|------------------------------------------|----------------------------------------------------|----------------------------------------------------|------------------------------------------------------------|
| ORDER OF OPERATIONS    | Needs support to choose the first operation. | Follows the order in familiar examples.  | Applies brackets, orders and operations correctly. | Applies the order accurately in varied tasks.      | Applies and justifies the order in unfamiliar tasks.       |
| ACCURACY               | Makes frequent calculation errors.           | Completes some calculations accurately.  | Calculates most expressions accurately.            | Calculates accurately and checks results.          | Calculates efficiently and verifies results independently. |
| BRACKETS & EXPONENTS   | Needs support with brackets and exponents.   | Uses brackets or exponents with prompts. | Evaluates brackets and exponents correctly.        | Inserts brackets to create required values.        | Creates and analyses complex grouped expressions.          |
| EQUIVALENT EXPRESSIONS | Needs support to compare expressions.        | Identifies some matching values.         | Understands and creates equivalent expressions.    | Explains why different expressions are equivalent. | Generalises and defends equivalence using clear reasoning. |
| EXPLANATION & CHECKING | Gives limited working or explanation.        | Shows some steps with prompting.         | Shows how to check and states the rule used.       | Explains errors and checks solutions clearly.      | Communicates precise reasoning and evaluates strategies.   |

## OVERALL JUDGEMENT

Beginning ☐ Developing ☐ Achieving ☐ Confident ☐ Exceeding ☐

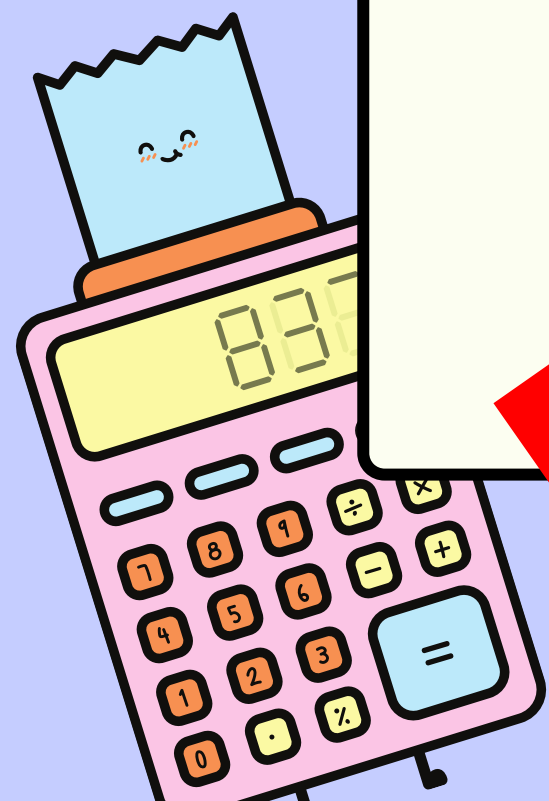
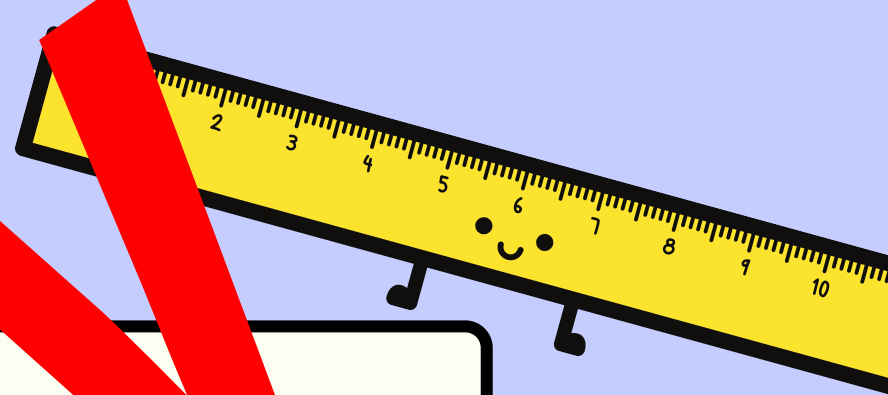
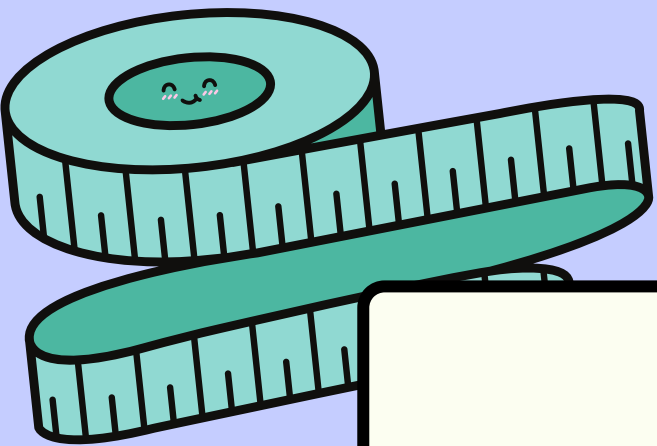
## STUDENT REFLECTION

One strength: \_\_\_\_\_

One next step: \_\_\_\_\_

# Order of Operations

**PREF**



# Learning Intention

We are learning to evaluate mathematical expressions by applying a consistent order of operations.

## SUCCESS CRITERIA

- I identify the first operation accurately.
- I work equal-priority operations from left to right.
- I show my steps and explain my reasoning.



# Expressions Use Operations

Expressions can include addition (+), subtraction (−), multiplication (×), division (÷), brackets and exponents.

The symbols are familiar. The sequence is what makes the answer reliable.



# Why Sequence Matters

$18 + 3 \times 8$  can be calculated in different ways.

$$(18 + 3) \times 8 = 168$$

$$18 + (3 \times 8) = 42$$

A shared order makes the meaning clear: 42.



# Two Memory Tools

BODMAS

Brackets, Orders, Division, Multiplication, Addition, Subtraction

PEMDAS

Parentheses, Exponents, Multiplication, Division, Addition, Subtraction

Both describe the same order.



# Brackets Come First

Complete the operations inside brackets and parentheses before anything outside them.

Example

$$5 \times (9 - 4)$$

$$= 5 \times 5$$

$$= 25$$



# Exponents Come Next

An exponent tells how many times a number is multiplied by itself.

$$3^2 = 3 \times 3 = 9$$

Example

$$3^2 + 7$$

$$= 9 + 7$$

$$= 16$$



# Divide and Multiply

Division and multiplication have equal priority.

Work from left to right.

$$36 \div 6 \times 4$$

$$= 6 \times 4$$

$$= 24$$



# Add and Subtract

Addition and subtraction have equal priority.

Work from left to right.

$$50 - 18 + 4$$

$$= 32 + 4$$

$$= 36$$



# Worked Example 1

Evaluate:

$$18 + 3 \times 8$$

Which operation has the highest priority?



# Multiply First

$$3 \times 8 = 24$$

Replace that part of the expression.

$$18 + 24$$



# Add Last

$$18 + 24 = 42$$

Therefore:

$$18 + 3 \times 8 = 42$$



# Worked Example 2

Evaluate:

$$42 \div 6 + (9 - 3)$$

Start with the brackets



# Step 1: Brackets

$$9 - 3 = 6$$

$$42 \div 6 + (9 - 3)$$

becomes

$$42 \div 6 + 6$$



## Step 2: Division

$$42 \div 6 = 7$$

$$42 \div 6 + 6$$

becomes

$$7 + 6$$



## Step 3: Addition

$$7 + 6 = 13$$

Therefore:

$$42 \div 6 + (9 - 3) = 13$$



# Guided Challenge

Evaluate:

$$7 \times (14 - 3) - (9 \times 2)$$

Which two groups of calculations can you complete first?



# Guided Challenge Answer

$$14 - 3 = 11$$

$$9 \times 2 = 18$$

$$7 \times 11 - 18$$

$$= 77 - 18$$

$$= 59$$



# Another Guided Challenge

Evaluate:

$$(3 \times 5) + (2 \times 7) + 2$$

Complete both grouped calculations before adding.



# Guided Challenge Answer

$$3 \times 5 = 15$$

$$2 \times 7 = 14$$

$$15 + 14 + 2$$

$$= 29 + 2$$

$$= 31$$



# Mixed Practice

A.  $6 + 4 \times 3$

B.  $(6 + 4) \times 3$

C.  $48 \div 6 + 5$

D.  $3^2 + 7$

E.  $40 - 12 \div 3$

Show the first operation for each.



# Mixed Practice Answers

A.  $6 + 12 = 18$

B.  $10 \times 3 = 30$

C.  $8 + 5 = 13$

D.  $9 + 7 = 16$

E.  $40 - 4 = 36$



# Word-Problem Strategy

1. Identify each quantity.
2. Decide which operations connect them.
3. Write one expression before calculating.
4. Evaluate one priority step at a time.
5. Check that the answer makes sense.



# Canteen Scenario

Six trays each hold 24 sandwiches. Another 16 sandwiches are added. All sandwiches are then shared equally among eight groups.

Write one expression to find the number per group.



# Canteen Solution

$$(6 \times 24 + 16) \div 8$$

$$= (144 + 16) \div 8$$

$$= 160 \div 8$$

$$= 20 \text{ sandwiches per group}$$



# Equivalent Expressions

Equivalent expressions look different but have the same value.

$$3 \times (8 + 2) = 30$$

$$40 - 5 \times 2 = 30$$

Because both expressions have the same value, the expressions are equivalent.



# Create an Equivalent Expression

Write a different expression equal to 24.

Your expression must include brackets and at least two operations.

Show a check that proves the value.



# One Possible Answer

$$(8 - 2) \times (3 + 1)$$

$$= 6 \times 4$$

$$= 24$$

Many other correct expressions are possible.

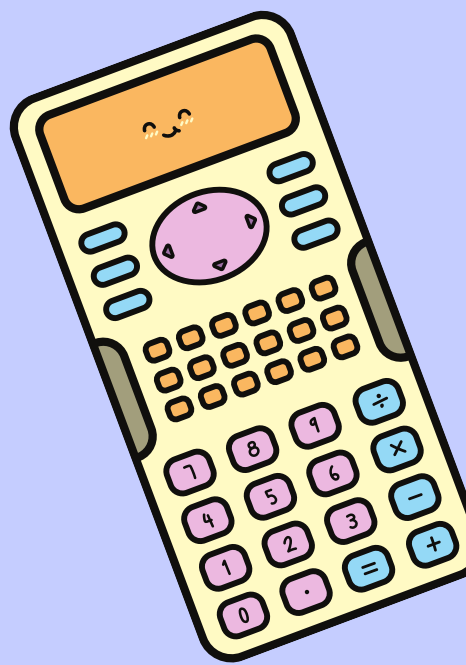
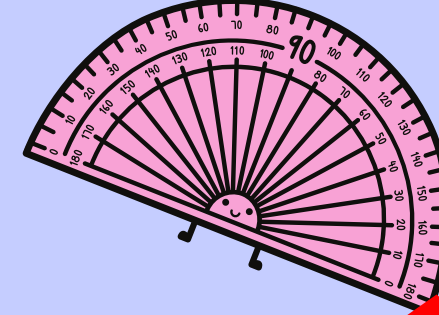
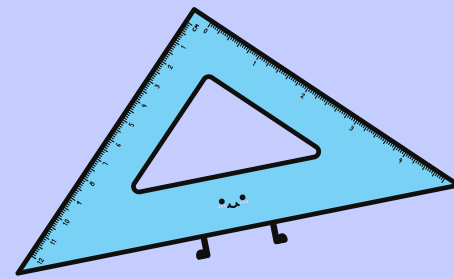
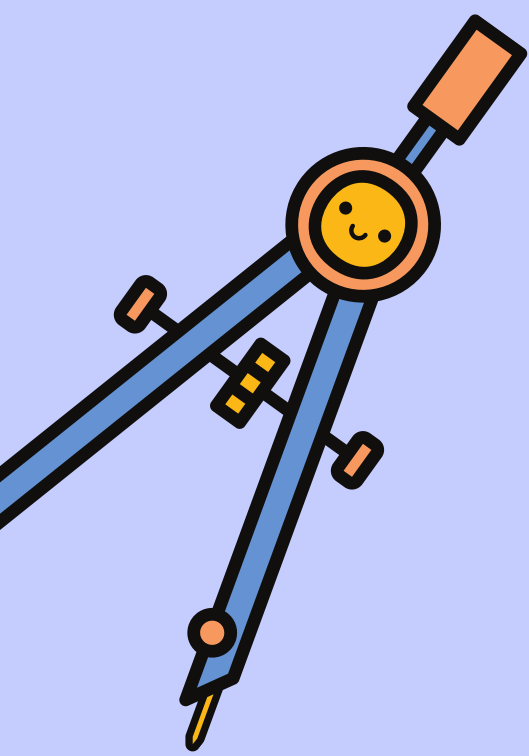


# Four Reliable Habits

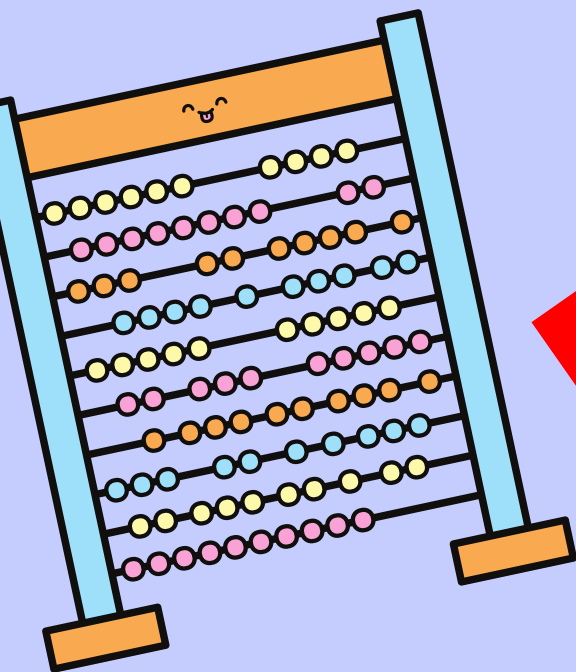
1. Complete brackets first.
2. Evaluate exponents next.
3. Work division and multiplication from left to right.
4. Work addition and subtraction from left to right.

Show one clear step on each line.

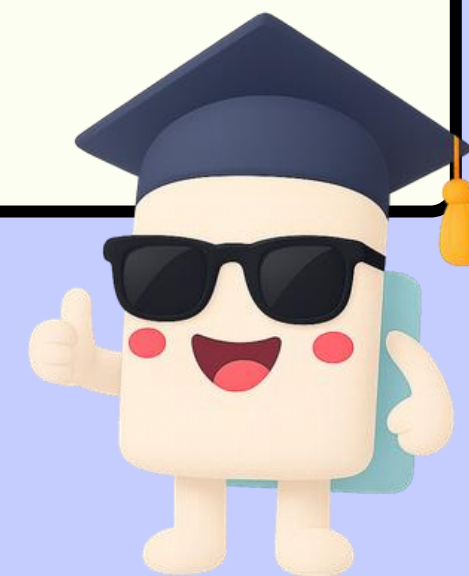
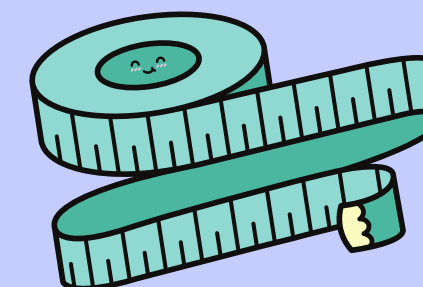
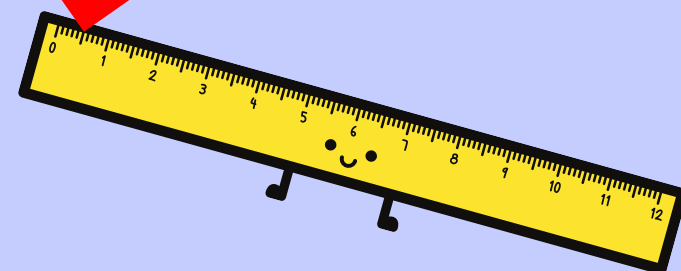




Well Done!



PREVIEW



# Order of Operations

## PREVIEW



# Question 1 — Multiple Choice

Evaluate:

$$12 + 4 \times 5$$

A. 80

B. 32

C. 36

D. 28



# Answer 1

B. 32

Multiply first:

$$4 \times 5 = 20$$

Then add:

$$12 + 20 = 32$$



# Question 2 — True or False

$$(18 - 6) \div 3 = 4$$

TRUE or FALSE?

Be ready to justify your choice



# Answer 2

TRUE

Complete the brackets:

$$18 - 6 = 12$$

Then divide:

$$12 \div 3 = 4$$



# Question 3 — Short Answer

Evaluate:

$$48 \div 6 + 7$$

Show the first step.



# Answer 3

$$48 \div 6 = 8$$

$$8 + 7 = 15$$

Answer: 15



# Question 4 — Multiple Choice

What is the first step in:

$$9 + 3 \times (8 - 2)$$

- A. Add  $9 + 3$
- B. Multiply  $3 \times 8$
- C. Subtract  $8 - 2$
- D. Divide  $8 \div 2$



# Answer 4

C. Subtract  $8 - 2$

Brackets have the highest priority.

$$8 - 2 = 6$$



# Question 5 — Short Answer

Add one pair of brackets so this equals 40

$$6 + 2 \times 5 = 40$$



# Answer 5

$$(6 + 2) \times 5 = 40$$

$$6 + 2 = 8$$

$$8 \times 5 = 40$$



# Question 6 — True or False

Multiplication is always completed before division.

TRUE or FALSE?

Explain the left-to-right rule.



# Answer 6

FALSE

Division and multiplication have equal priority.

Complete whichever appears first when reading from left to right.



# Question 7 — Multiple Choice

Which expression is equivalent to:

$$(7 + 5) \times 3$$

A.  $7 + 5 \times 3$

B.  $7 \times 3 + 5 \times 3$

C.  $7 + 5 + 3$

D.  $7 \times 3 + 3$



# Answer 7

$$\text{B. } 7 \times 3 + 5 \times 3$$

$$(7 + 5) \times 3 = 12 \times 3 = 36$$

$$21 + 15 = 36$$



# Question 8 — Short Answer

Evaluate:

$$3^2 + 4 \times 2$$

Show both priority calculations



# Answer 8

$$3^2 = 9$$

$$4 \times 2 = 8$$

$$9 + 8 = 17$$

Answer: 17



## Question 9 — Multiple Choice

Five groups earn 18 tokens each. Ten bonus tokens are added. The total is shared equally among 10 students.

$$(5 \times 18 + 10) \div 10$$

A. 10   B. 50   C. 90   D. 200



# Answer q

A. 10

$$5 \times 18 = 90$$

$$90 + 10 = 100$$

$$100 \div 10 = 10$$



# Question 10 — Error Analysis

A student says:

$$20 - 8 \div 4 = 3$$

Explain the error and give the correct value.



# Answer 10

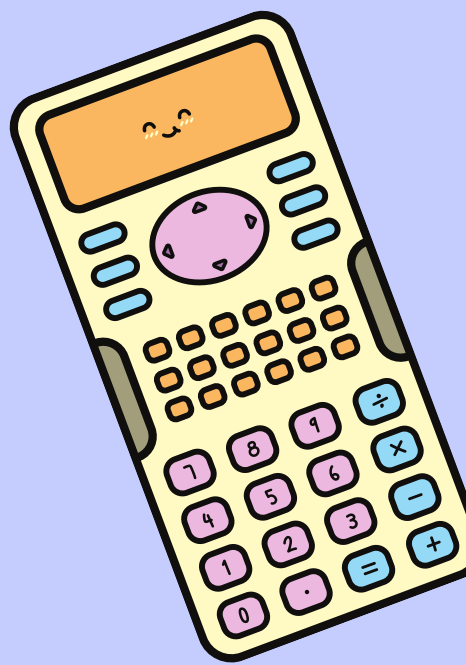
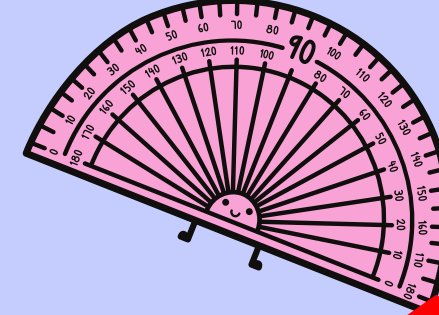
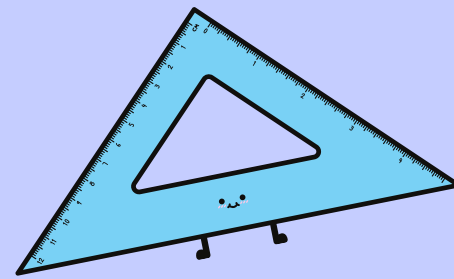
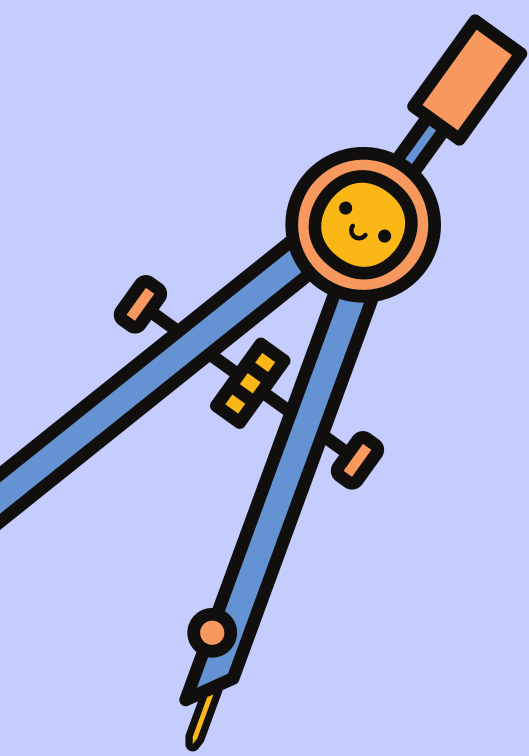
Division comes before subtraction.

$$8 \div 4 = 2$$

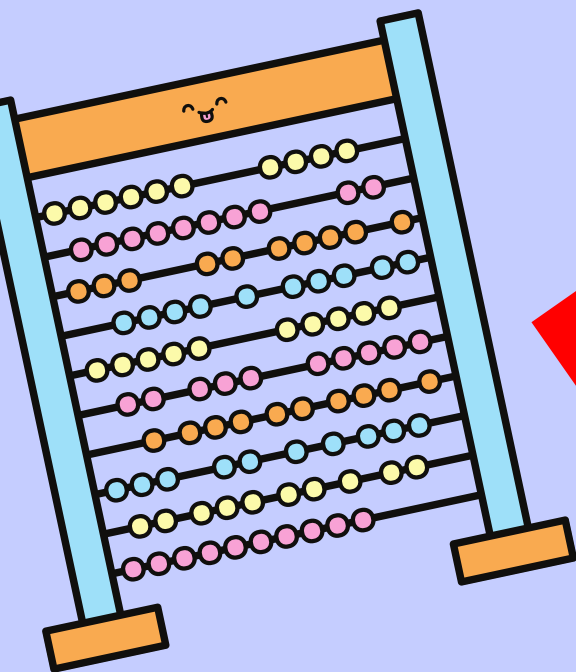
$$20 - 2 = 18$$

Correct value: 18





Well Done!



PREVIEW

