

15. [Order of Operations]

Skill 15.1 Using 'order of operations' involving single \times or \div and a single $+$ or $-$

MMBlue 1 1 2 2 3 3 4 4
MMGreen 1 1 2 2 3 3 4 4

The correct order of operations for questions involving a single \times or \div and a single $+$ or $-$ is: Firstly, work out the multiplication or division, then work out the addition or subtraction.

Q. $2 + 3 \times 5 =$

A. $2 + 3 \times 5$
 $= 2 + 15$
 $= 17$

First do the multiplication, 3 times 5 and then the addition, plus 2.

Q. $8 \div 2 - 2 =$

A. $8 \div 2 - 2$
 $= 4 - 2$
 $= 2$

First do the division, 8 divided by 2 and then the subtraction, take 2.

a) $4 \times 3 - 6 =$

$= 12 - 6$
 $= 6$

b) $5 + 5 \times 5 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

c) $15 + 4 \times 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

d) $35 - 5 \times 6 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

e) $40 - 18 \div 3 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

f) $36 \div 9 - 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

g) $15 \div 3 + 6 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

h) $22 - 5 \times 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

i) $20 - 12 \div 2 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

j) $10 \times 3 + 40 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

k) $4 + 48 \div 3 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

l) $100 \div 4 - 6 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

m) $32 + 20 \times 8 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

n) $40 - 12 \div 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

o) $6 \times 3 - 3 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

p) $12 + 10 \times 2 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

Skill 15.2 Using 'order of operations' involving multiple + and/or -

MMBlue 1 1 2 2 3 3 4 4
MMGreen 1 1 2 2 3 3 4 4

When working with multiple addition (+) and/or subtraction (-), work from left to right.

Q. $5 + 2 - 3 =$

A. $5 + 2 - 3$
 $= 7 - 3$
 $= 4$

Working from left to right means do the addition first, 5 plus 2 gives 7, then the subtraction, 7 minus 3.

Q. $9 - 4 - 3 =$

A. $9 - 4 - 3$
 $= 5 - 3$
 $= 2$

Working from left to right means do the subtraction 9 minus 4 first, then the subtraction, 5 minus 3.

a) $7 - 4 + 6 =$

$= 3 + 6$

$= 9$

b) $10 + 5 - 8 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

c) $12 - 4 - 3 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

d) $13 + 5 + 2 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

e) $10 + 7 - 9 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

f) $9 + 5 - 6 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

g) $19 - 6 - 5 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

h) $14 - 8 + 5 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

i) $18 + 3 - 6 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

j) $36 - 23 + 4 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

k) $20 - 11 - 5 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

l) $5 + 25 + 50 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

m) $40 - 16 - 19 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

n) $24 + 8 - 16 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

o) $30 - 12 + 12 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

p) $10 + 8 - 8 =$

$= \dots\dots\dots$

$= \dots\dots\dots$

When working with multiplication (\times) and/or division (\div), work from left to right.

Q. $9 \div 3 \times 8 =$

A. $9 \div 3 \times 8$
 $= 3 \times 8$
 $= 24$

Working from left to right means do the division first, 9 divided by 3, then do 3 multiplied by 8.

Q. $36 \div 4 \div 3 =$

A. $36 \div 4 \div 3$
 $= 9 \div 3$
 $= 3$

Working from left to right means do the division, 36 divided by 4 first, then do 9 divided by 3.

a) $12 \div 4 \times 7 =$

$= 3 \times 7$
 $= 21$

b) $6 \times 2 \div 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

c) $24 \div 6 \times 2 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

d) $18 \div 6 \div 3 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

e) $8 \times 6 \div 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

f) $30 \div 5 \times 7 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

g) $54 \div 6 \times 3 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

h) $12 \times 10 \div 2 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

i) $36 \div 6 \times 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

j) $8 \times 5 \div 4 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

k) $60 \div 10 \times 9 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

l) $15 \times 3 \div 9 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

m) $36 \div 6 \div 2 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

n) $9 \times 8 \div 6 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

o) $45 \div 5 \div 3 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

p) $75 \div 25 \times 3 =$

$= \dots\dots\dots$
 $= \dots\dots\dots$

Skill 15.4 Using 'order of operations' involving brackets () and one other operation.

Simplify within the brackets before completing \times , \div and/or finally $+$, $-$

Q. $5 \times (12 - 8) =$

A. $5 \times (12 - 8)$
 $= 5 \times 4$
 $= 20$

Simplify inside the brackets first: $12 - 8 = 4$, then multiply by 5.

Q. $15 - (9 + 3) =$

A. $15 - (9 + 3)$
 $= 15 - 12$
 $= 3$

Simplify inside the brackets first: $9 + 3 = 12$, then subtract 12 from 15.

a) $6 - (3 + 2) =$
 $= 6 - 5$
 $= 1$

b) $5 \times (48 \div 8) =$
 $=$
 $=$

c) $(27 - 17) \times 4 =$
 $=$
 $=$

d) $16 \div (3 + 5) =$
 $=$
 $=$

e) $16 - (8 + 4) =$
 $=$
 $=$

f) $7 \times (14 - 9) =$
 $=$
 $=$

g) $(18 - 15) \times 9 =$
 $=$
 $=$

h) $(8 + 12) \div 5 =$
 $=$
 $=$

i) $20 - (8 + 9) =$
 $=$
 $=$

j) $4 \times (36 \div 3) =$
 $=$
 $=$

k) $(10 - 8) \times 3 =$
 $=$
 $=$

l) $45 \div (9 + 6) =$
 $=$
 $=$

m) $32 - (15 + 7) =$
 $=$
 $=$

n) $6 \times (17 - 8) =$
 $=$
 $=$

o) $(23 - 16) \times 7 =$
 $=$
 $=$

p) $(15 + 25) \div 10 =$
 $=$
 $=$

The correct order of operations is:

1. Simplify within brackets.
2. Simplify powers.
3. Multiply and/or divide from left to right.
4. Add and/or subtract from left to right.

Q. $5 + 4^2 =$

A. $5 + 4^2$
 $= 5 + 16$
 $= 21$

First complete the square,
 4 times 4 and then do the addition, plus 5.

Q. $(2 \times 6)^2 =$

A. $(2 \times 6)^2$
 $= 12^2$
 $= 144$

First work within the brackets multiplying
 2 by 6 and then square the result.

a) $7^2 - 7 =$

$= 49 - 7$
 $= 42$

b) $4 \times 3^2 =$

$=$
 $=$

c) $(4 \times 3)^2 =$

$=$
 $=$

d) $6^2 \div 3 =$

$=$
 $=$

e) $5^2 \times 3 =$

$=$
 $=$

f) $4^2 \div 2 =$

$=$
 $=$

g) $(8 - 2)^2 =$

$=$
 $=$

h) $5^2 + 25 =$

$=$
 $=$

i) $4 + 3^2 \times 5 =$

$= 4 + 9 \times 5$
 $= 4 + 45$
 $= 49$

j) $4^2 \div (3 + 5) =$

$=$
 $=$
 $=$

k) $5 \times (3^2 + 1) =$

$=$
 $=$
 $=$

l) $3 \times 5^2 - 3 =$

$=$
 $=$
 $=$

m) $16 \div (3^2 - 1) =$

$=$
 $=$
 $=$

n) $8^2 \div (6 - 2) =$

$=$
 $=$
 $=$

o) $10 + 5^2 \div 1 =$

$=$
 $=$
 $=$

p) $24 \div (2^2 + 2^2) =$

$=$
 $=$
 $=$

Skill 15.7 Using 'order of operations' involving powers, a mix of (), ×, ÷, + or - and positive and negative numbers.

The correct order of operations is:

1. Simplify within brackets.
2. Simplify powers.
3. Multiply and/or divide from left to right.
4. Add and/or subtract from left to right.

Q. $(-2 - 4) \times 3 + 7 =$	A. $(-2 - 4) \times 3 + 7$ $= (-6) \times 3 + 7$ $= (-18) + 7$ $= -11$	<i>Simplify inside the brackets first: $-2 - 4 = -6$, then do the multiplication $(-6) \times 3 = -18$, because $6 \times 3 = 18$ and $(-) \times (+) = -$ Finally add -18 and 7.</i>
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Q. $4 \times (-5) + 3^2 =$	A. $4 \times (-5) + 3^2$ $= (-20) + 9$ $= -11$	<i>Simplify the power first: $3^2 = 3 \times 3 = 9$, then do the multiplication $4 \times (-5) = -20$, because $4 \times 5 = 20$ and $(+) \times (-) = -$ Finally add -20 and 9.</i>
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Q. $(-4)^2 - 8 + 6 =$	A. $(-4)^2 - 8 + 6$ $= 16 - 8 + 6$ $= 8 + 6$ $= 14$	<i>Simplify the power first: $(-4)^2 = (-4) \times (-4) = 16$, then subtract 8 from 16. Finally add 8 and 6.</i>
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a) $(-3 - 2) \times 5 + 10 =$
 $= (-5) \times 5 + 10$
 $= -25 + 10$
 $= -15$

b) $(-1 - 6) \times 2 + 8 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

c) $(-5 - 4) \times 3 - 9 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

d) $2 \times (-6) - 3^2 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

e) $(-3) \times 5 + 4^2 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

f) $2^2 \times 5 \div 4 + 12 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

g) $(-2)^2 + 8 - 5 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

h) $6 \times (-1)^2 - 2^2 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

i) $(-5)^2 + 12 \div 4 - 1 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

The correct order of operations is:

1. Simplify within brackets.
2. Simplify powers and square roots working from left to right.
3. Multiply and/or divide from left to right.
4. Add and/or subtract from left to right.

Q. $10 \times (-3) + \sqrt{49} =$

A. $10 \times (-3) + \sqrt{49}$
 $= 10 \times (-3) + 7$
 $= (-30) + 7$
 $= -23$

Simplify the square root first: $\sqrt{49} = \sqrt{7 \times 7} = 7$, then do the multiplication $10 \times (-3) = -30$. Finally add -30 and 7 .

Q. $\sqrt{4 + 60} =$

A. $\sqrt{4 + 60}$
 $= \sqrt{64}$
 $= 8$

To simplify the square root, do the addition inside first: $4 + 60 = 64$. Then simplify the square root: $\sqrt{64} = \sqrt{8 \times 8} = 8$.

Q. $6 \times (-5)^2 + \sqrt{36} =$

A. $6 \times (-5)^2 + \sqrt{36}$
 $= 6 \times 25 + 6$
 $= 150 + 6$
 $= 156$

Simplify the power and the square root first: $(-5)^2 = (-5) \times (-5) = 25$ and $\sqrt{36} = \sqrt{6 \times 6} = 6$. Then multiply 6 by 25 . Finally add 150 and 6 .

a) $8 \times (-4) + \sqrt{16} =$
 $= 8 \times (-4) + 4$
 $= -32 + 4$
 $= -28$

b) $4 \times (-3) + \sqrt{100} =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

c) $(-5) \times \sqrt{9} + 15 =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

d) $\sqrt{36 + 64} =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

e) $\sqrt{6^2 + 8^2} =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

f) $(-3)^2 + 10 - \sqrt{25} =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

g) $(-2)^3 \times 6 + \sqrt{36} =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

h) $7 \times (-3)^2 + \sqrt{25} =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$

i) $(-2)^3 + 12 + \sqrt{81} =$
 $= \dots\dots\dots$
 $= \dots\dots\dots$
 $= \dots\dots\dots$