Grade 8 Math Review Workbook

5 lessons · printable · answer key at the back

Scan to open this book

Name _____ Date _____

Contents

Working in Scientific Notation

WORKED EXAMPLE

$(7.5 \times 10^4) \div (2.5 \times 10^5) = c \times 10^n$

c = 3 n = −1

1. Multiplying and dividing in scientific notation

Work each one out. Write every answer in scientific notation.

1 $(5 \times 10^7) \div (2.5 \times 10^{-2}) = c \times 10^n$

c = ____ n = ____

2 $(6 \times 10^{-4}) \div (5 \times 10^{-2}) = c \times 10^n$

c = ____ n = ____

3 $(4 \times 10^8) \times (2.5 \times 10^{-1}) = c \times 10^n$

c = ____ n = ____

4 $(1.5 \times 10^{-2}) \times (6 \times 10^{-1}) = c \times 10^n$

c = ____ n = ____

5 $(3 \times 10^8) \div (2.5 \times 10^{-4}) = c \times 10^n$

c = ____ n = ____

6 $(2.5 \times 10^3) \times (6 \times 10^3) = c \times 10^n$

c = ____ n = ____

7 $(5 \times 10^{-3}) \div (2.5 \times 10^5) = c \times 10^n$

c = ____ n = ____

8 $(4 \times 10^5) \times (2 \times 10^5) = c \times 10^n$

c = ____ n = ____

9 $(2 \times 10^{-2}) \div (5 \times 10^8) = c \times 10^n$

c = ____ n = ____

10 $(6 \times 10^{-4}) \div (2.5 \times 10^3) = c \times 10^n$

c = ____ n = ____

11 $(2 \times 10^4) \times (5 \times 10^{-3}) = c \times 10^n$

c = ____ n = ____

12 $(1.5 \times 10^3) \times (6 \times 10^3) = c \times 10^n$

c = ____ n = ____

13 $(7.5 \times 10^8) \div (5 \times 10^{-1}) = c \times 10^n$

c = ____ n = ____

14 $(7.5 \times 10^7) \times (6 \times 10^{-1}) = c \times 10^n$

c = ____ n = ____

15 $(4.5 \times 10^4) \div (1.5 \times 10^4) = c \times 10^n$

c = ____ n = ____

16 $(5 \times 10^5) \times (1.2 \times 10^{-5}) = c \times 10^n$

c = ____ n = ____

17 $(4 \times 10^5) \times (2.5 \times 10^5) = c \times 10^n$

c = ____ n = ____

18 $(1.5 \times 10^8) \times (1.2 \times 10^3) = c \times 10^n$

c = ____ n = ____

19 $(4 \times 10^{-2}) \times (1.2 \times 10^{-4}) = c \times 10^n$

c = ____ n = ____

20 $(6 \times 10^{-2}) \times (4.5 \times 10^8) = c \times 10^n$

c = ____ n = ____

21 $(2 \times 10^8) \times (3 \times 10^{-1}) = c \times 10^n$

c = ____ n = ____

22 $(3 \times 10^7) \div (5 \times 10^2) = c \times 10^n$

c = ____ n = ____

23 $(1.5 \times 10^2) \times (5 \times 10^7) = c \times 10^n$

c = ____ n = ____

Systems of Equations

WORKED EXAMPLE

$-9x + 9y = -36$ $x = -3$
$x - 9y = 60$ $y = -7$

2. Systems of equations

Solve each pair by adding the two equations. Give x and y.

1 $11x + 9y = -4$ $x =$ ____
$-8x - 9y = -29$ $y =$ ____

2 $9x + 8y = -8$ $x =$ ____
$6x - 8y = 8$ $y =$ ____

3 $-2x + 6y = -10$ $x =$ ____
$11x - 6y = 55$ $y =$ ____

4 $3x + 10y = 18$ $x =$ ____
$-4x - 10y = -24$ $y =$ ____

5 $-2x + 3y = -2$ $x =$ ____
$6x - 3y = 6$ $y =$ ____

6 $9x + 4y = 42$ $x =$ ____
$10x - 4y = -4$ $y =$ ____

7 $7x + 11y = 42$ $x =$ ____
$6x - 11y = 36$ $y =$ ____

8 $x + 2y = 6$ $x =$ ____
$11x - 2y = 18$ $y =$ ____

9 $-11x + 12y = -9$ $x =$ ____
$12x - 12y = 24$ $y =$ ____

10 $-10x + 6y = -54$ $x =$ ____
$-5x - 6y = 54$ $y =$ ____

11 $-4x + 2y = 30$ $x =$ ____
$7x - 2y = -33$ $y =$ ____

12 $-6x + y = -4$ $x =$ ____
$-2x - y = -4$ $y =$ ____

13 $10x + 8y = 56$ $x =$ ____
$5x - 8y = 4$ $y =$ ____

14 $-8x + 10y = -20$ $x =$ ____
$10x - 10y = 30$ $y =$ ____

15 $2x + 5y = -37$ $x =$ ____
$11x - 5y = 24$ $y =$ ____

16 $-6x + 8y = -46$ $x =$ ____
$-10x - 8y = 30$ $y =$ ____

17 $12x + 2y = 54$ $x =$ ____
$12x - 2y = -6$ $y =$ ____

18 $-7x + 7y = 21$ $x =$ ____
$2x - 7y = 39$ $y =$ ____

19 $-9x + 10y = -7$ $x =$ ____
$7x - 10y = 21$ $y =$ ____

20 $-4x + 7y = -12$ $x =$ ____
$-12x - 7y = -36$ $y =$ ____

21 $5x + 2y = 27$ $x =$ ____
$-8x - 2y = -36$ $y =$ ____

22 $-12x + 2y = 40$ $x =$ ____
$-10x - 2y = -18$ $y =$ ____

Is It a Function?

WORKED EXAMPLE

x	4	6	15	6
y	58	38	32	49

Yes / (No)

3. Is it a function?

Does each table show a function? Circle one.

1

x	10	15	14	15
y	40	52	33	56

Yes / No

2

x	16	9	21	10
y	46	16	22	22

Yes / No

3

x	8	16	24	8
y	22	49	24	17

Yes / No

4

x	5	15	12	22
y	42	28	6	60

Yes / No

5

x	10	3	6	21
y	42	42	23	43

Yes / No

6

x	5	19	5	12
y	48	27	14	33

Yes / No

7

x	23	17	10	18
y	40	11	36	40

Yes / No

8

x	17	2	11	9
y	18	51	41	38

Yes / No

9

x	2	22	6	14
y	45	17	31	31

Yes / No

10

x	2	15	20	20
y	18	16	13	29

Yes / No

11

x	2	9	8	0
y	21	21	1	32

Yes / No

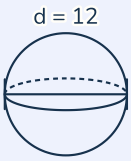
12

x	22	22	13	19
y	57	26	30	60

Yes / No

Volume of Spheres

WORKED EXAMPLE

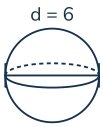


904.32

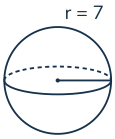
4. Volume of a sphere

Find the volume of each sphere. Use π = 3.14. Round to the hundredth.

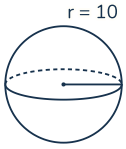
1



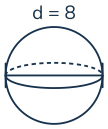
2



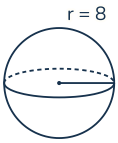
3



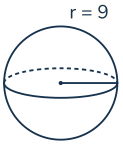
4



5



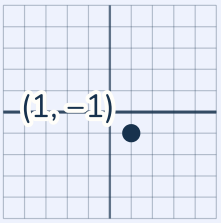
6



7

Transformations

WORKED EXAMPLE



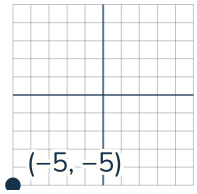
in the x-axis

(1 , 1)

5. Transformations on a grid

Move each point as described. Write where it lands.

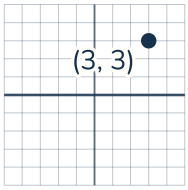
1



180° about O

(_____ , _____)

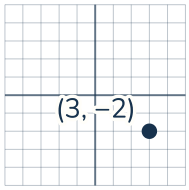
2



in the x-axis

(_____ , _____)

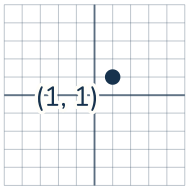
3



90° counterclockwise about O

(_____ , _____)

4



5 left and 3 up

(_____ , _____)

Answer Key (1 of 2)

Working in Scientific Notation

Multiplying and dividing in scientific notation

1. $(5 \times 10^{7}) \div (2.5 \times 10^{-2}) = 2 \times 10^{9}$
2. $(6 \times 10^{-4}) \div (5 \times 10^{-2}) = 1.2 \times 10^{-2}$
3. $(4 \times 10^{8}) \times (2.5 \times 10^{-1}) = 1 \times 10^{8}$
4. $(1.5 \times 10^{-2}) \times (6 \times 10^{-1}) = 9 \times 10^{-3}$
5. $(3 \times 10^{8}) \div (2.5 \times 10^{-4}) = 1.2 \times 10^{12}$
6. $(2.5 \times 10^{3}) \times (6 \times 10^{3}) = 1.5 \times 10^{7}$
7. $(5 \times 10^{-3}) \div (2.5 \times 10^{5}) = 2 \times 10^{-8}$
8. $(4 \times 10^{5}) \times (2 \times 10^{5}) = 8 \times 10^{10}$
9. $(2 \times 10^{-2}) \div (5 \times 10^{8}) = 4 \times 10^{-11}$
10. $(6 \times 10^{-4}) \div (2.5 \times 10^{3}) = 2.4 \times 10^{-7}$
11. $(2 \times 10^{4}) \times (5 \times 10^{-3}) = 1 \times 10^{2}$
12. $(1.5 \times 10^{3}) \times (6 \times 10^{3}) = 9 \times 10^{6}$
13. $(7.5 \times 10^{8}) \div (5 \times 10^{-1}) = 1.5 \times 10^{9}$
14. $(7.5 \times 10^{7}) \times (6 \times 10^{-1}) = 4.5 \times 10^{7}$
15. $(4.5 \times 10^{4}) \div (1.5 \times 10^{4}) = 3 \times 10^{0}$
16. $(5 \times 10^{5}) \times (1.2 \times 10^{-5}) = 6 \times 10^{0}$
17. $(4 \times 10^{5}) \times (2.5 \times 10^{5}) = 1 \times 10^{11}$
18. $(1.5 \times 10^{8}) \times (1.2 \times 10^{3}) = 1.8 \times 10^{11}$
19. $(4 \times 10^{-2}) \times (1.2 \times 10^{-4}) = 4.8 \times 10^{-6}$
20. $(6 \times 10^{-2}) \times (4.5 \times 10^{8}) = 2.7 \times 10^{7}$
21. $(2 \times 10^{8}) \times (3 \times 10^{-1}) = 6 \times 10^{7}$
22. $(3 \times 10^{7}) \div (5 \times 10^{2}) = 6 \times 10^{4}$
23. $(1.5 \times 10^{2}) \times (5 \times 10^{7}) = 7.5 \times 10^{9}$

Systems of Equations

Systems of equations

1. $11x + 9y = -4, -8x - 9y = -29 \rightarrow (-11, 13)$
2. $9x + 8y = -8, 6x - 8y = 8 \rightarrow (0, -1)$
3. $-2x + 6y = -10, 11x - 6y = 55 \rightarrow (5, 0)$
4. $3x + 10y = 18, -4x - 10y = -24 \rightarrow (6, 0)$
5. $-2x + 3y = -2, 6x - 3y = 6 \rightarrow (1, 0)$
6. $9x + 4y = 42, 10x - 4y = -4 \rightarrow (2, 6)$
7. $7x + 11y = 42, 6x - 11y = 36 \rightarrow (6, 0)$
8. $x + 2y = 6, 11x - 2y = 18 \rightarrow (2, 2)$
9. $-11x + 12y = -9, 12x - 12y = 24 \rightarrow (15, 13)$
10. $-10x + 6y = -54, -5x - 6y = 54 \rightarrow (0, -9)$
11. $-4x + 2y = 30, 7x - 2y = -33 \rightarrow (-1, 13)$
12. $-6x + y = -4, -2x - y = -4 \rightarrow (1, 2)$
13. $10x + 8y = 56, 5x - 8y = 4 \rightarrow (4, 2)$
14. $-8x + 10y = -20, 10x - 10y = 30 \rightarrow (5, 2)$
15. $2x + 5y = -37, 11x - 5y = 24 \rightarrow (-1, -7)$
16. $-6x + 8y = -46, -10x - 8y = 30 \rightarrow (1, -5)$
17. $12x + 2y = 54, 12x - 2y = -6 \rightarrow (2, 15)$
18. $-7x + 7y = 21, 2x - 7y = 39 \rightarrow (-12, -9)$
19. $-9x + 10y = -7, 7x - 10y = 21 \rightarrow (-7, -7)$
20. $-4x + 7y = -12, -12x - 7y = -36 \rightarrow (3, 0)$

Systems of Equations (continued)

Systems of equations (continued)

21. $5x + 2y = 27, -8x - 2y = -36 \rightarrow (3, 6)$
22. $-12x + 2y = 40, -10x - 2y = -18 \rightarrow (-1, 14)$

Is It a Function?

Is it a function?

1. (10, 40) (15, 52) (14, 33) (15, 56): No — the input 15 goes to 52 and also to 56, and one input may only go to one place
2. (16, 46) (9, 16) (21, 22) (10, 22): Yes — every input appears once — 22 turns up twice, but that is an output, and two inputs may land on the same one
3. (8, 22) (16, 49) (24, 24) (8, 17): No — the input 8 goes to 22 and also to 17, and one input may only go to one place
4. (5, 42) (15, 28) (12, 6) (22, 60): Yes — every input appears once, so no input can go to two places
5. (10, 42) (3, 42) (6, 23) (21, 43): Yes — every input appears once — 42 turns up twice, but that is an output, and two inputs may land on the same one
6. (5, 48) (19, 27) (5, 14) (12, 33): No — the input 5 goes to 48 and also to 14, and one input may only go to one place
7. (23, 40) (17, 11) (10, 36) (18, 40): Yes — every input appears once — 40 turns up twice, but that is an output, and two inputs may land on the same one
8. (17, 18) (2, 51) (11, 41) (9, 38): Yes — every input appears once, so no input can go to two places
9. (2, 45) (22, 17) (6, 31) (14, 31): Yes — every input appears once — 31 turns up twice, but that is an output, and two inputs may land on the same one
10. (2, 18) (15, 16) (20, 13) (20, 29): No — the input 20 goes to 13 and also to 29, and one input may only go to one place
11. (2, 21) (9, 21) (8, 1) (0, 32): Yes — every input appears once — 21 turns up twice, but that is an output, and two inputs may land on the same one
12. (22, 57) (22, 26) (13, 30) (19, 60): No — the input 22 goes to 57 and also to 26, and one input may only go to one place

Volume of Spheres

Volume of a sphere

1. d = 6: 113.04 cm^3
2. r = 7: 1436.03 cm^3
3. r = 10: 4186.67 cm^3
4. d = 8: 267.95 cm^3
5. r = 8: 2143.57 cm^3
6. r = 9: 3052.08 cm^3
7. r = 2: 33.49 cm^3

Answer Key (2 of 2)

Transformations

Transformations on a grid

1. (−5, −5) 180° about O: (5, 5)
2. (3, 3) in the x-axis: (3, −3)
3. (3, −2) 90° counterclockwise about O: (2, 3)
4. (1, 1) 5 left and 3 up: (−4, 4)

Solutions (1 of 6)

Working in Scientific Notation

Multiplying and dividing in scientific notation

1. $(5 \times 10^{7}) \div (2.5 \times 10^{-2}) = c \times 10^{n}$

   c = ____ n = ____

$(5 \times 10^{7}) \div (2.5 \times 10^{-2}) =$

2×10^{9}

A number in scientific notation is two things multiplied: a coefficient and a power of ten. They travel separately — the coefficients divide with each other and the powers subtract with each other — so take them one at a time.

Divide the coefficients: $5 \div 2.5 = 2$.

Now the powers. Dividing powers of the same base SUBTRACTS the exponents: $7 - -2 = 9$. So the powers give 10^{9}.

Put them together: 2×10^{9}. Now CHECK it — a coefficient has to be at least 1 and less than 10, and 2 is. Nothing left to do, and it was still worth looking: this is the step that catches the ones that are not.

So the answer is 2×10^{9} — $5 \div 2.5 = 2$ and the powers give 10^{9}.

2. $(6 \times 10^{-4}) \div (5 \times 10^{-2}) = c \times 10^{n}$

   c = _____ n = _____

$(6 \times 10^{-4}) \div (5 \times 10^{-2}) =$

1.2×10^{-2}

A number in scientific notation is two things multiplied: a coefficient and a power of ten. They travel separately — the coefficients divide with each other and the powers subtract with each other — so take them one at a time.

Divide the coefficients: $6 \div 5 = 1.2$.

Now the powers. Dividing powers of the same base SUBTRACTS the exponents: $-4 - -2 = -2$. So the powers give 10^{-2}.

Put them together: 1.2×10^{-2}. Now CHECK it — a coefficient has to be at least 1 and less than 10, and 1.2 is. Nothing left to do, and it was still worth looking: this is the step that catches the ones that are not.

So the answer is 1.2×10^{-2} — $6 \div 5 = 1.2$ and the powers give 10^{-2}.

Solutions (2 of 6)

Systems of Equations

Systems of equations

1. **$11x + 9y = -4$** $x =$ ____
   $-8x - 9y = -29$ $y =$ ____

$x = -11$

$y = 13$

Two equations, two letters. Neither one can be solved on its own — so the first move, whichever method you use, is to get down to ONE equation with ONE letter in it.

Look at the y terms: 9y in the first and −9y in the second. They are opposites, so adding the two equations makes them cancel.

Adding is allowed because both sides of each equation are equal — adding left to left and right to right keeps the balance, the same as adding a number to both sides. That gives $3x = -33$.

One letter left. $-33 \div 3 = -11$, so $x = -11$.

Now put x back into either equation to get y — this is the half that gets forgotten. It gives $y = 13$, so the solution is $(-11, 13)$.

2. **$9x + 8y = -8$** $x =$ ____
   $6x - 8y = 8$ $y =$ ____

$x = 0$

$y = -1$

Two equations, two letters. Neither one can be solved on its own — so the first move, whichever method you use, is to get down to ONE equation with ONE letter in it.

Look at the y terms: 8y in the first and −8y in the second. They are opposites, so adding the two equations makes them cancel.

Adding is allowed because both sides of each equation are equal — adding left to left and right to right keeps the balance, the same as adding a number to both sides. That gives $15x = 0$.

One letter left. $0 \div 15 = 0$, so $x = 0$.

Now put x back into either equation to get y — this is the half that gets forgotten. It gives $y = -1$, so the solution is $(0, -1)$.

Solutions (3 of 6)

Is It a Function?

Is it a function?

1.

x	10	15	14	15
y	40	52	33	56

Yes / No

Is this a function? **No**

A function has one rule: every input gets exactly ONE output. So there is only one column to check — the inputs, which are the top row of the table.

Pull the inputs out on their own and look at them together: 10, 15, 14, 15. Nothing about the outputs matters yet.

15 is in that list twice, and the two pairs it belongs to do not agree: the input 15 goes to 52 and also to 56, and one input may only go to one place.

One input, two different outputs. That is the one thing a function is not allowed to do, so this relation is not a function.

2.

x	16	9	21	10
y	46	16	22	22

Yes / No

Is this a function? **Yes**

A function has one rule: every input gets exactly ONE output. So there is only one column to check — the inputs, which are the top row of the table.

Pull the inputs out on their own and look at them together: 16, 9, 21, 10. Nothing about the outputs matters yet.

Now the check: every input appears once — 22 turns up twice, but that is an output, and two inputs may land on the same one.

Two different inputs are ALLOWED to land on the same output — the way both 2 and −2 square to 4, or every hour of a flat day has the same temperature. It is the input column that may not repeat, and it is the only one.

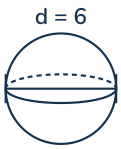
Every input has exactly one output, so this relation is a function.

Solutions (4 of 6)

Volume of Spheres

Volume of a sphere

1.



diameter: 6 cm

$6 \div 2 = 3$

$3 \times 3 \times 3 = 27$

$4/3 \times 3.14 \times 27 =$

113.04

113.04 cm³

The 6 cm marked here goes right ACROSS the sphere — that is the diameter. The formula wants the radius, and using the diameter instead makes the answer EIGHT times too big, because it is cubed.

Half of 6 is 3, so r = 3 cm.

Cube the radius on a line of its own. r^3 means r × r × r, not r × 3: 3 × 3 × 3 = 27.

Then four-thirds of that, times π: 4/3 × 3.14 × 27 = 113.04.

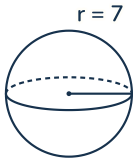
So the volume is 113.04 cubic cm. Cubic, not square — a volume fills a space, and the unit is the quickest way to notice you have answered a surface-area question instead.

Solutions (5 of 6)

Volume of Spheres (continued)

Volume of a sphere (continued)

2.



_____

radius: 7 cm

$7 \times 7 \times 7 = 343$

$4/3 \times 3.14 \times 343 \approx 1436.03$

1436.03 cm³

The 7 cm marked here runs from the center to the surface, so it is already the radius — which is what the formula wants.

Cube the radius on a line of its own. r^3 means $r \times r \times r$, not $r \times 3$: $7 \times 7 \times 7 = 343$.

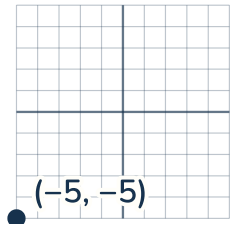
Then four-thirds of that, times π: $4/3 \times 3.14 \times 343$ comes to 1436.0267..., which is 1436.03 to two decimal places. A third rarely lands on a whole number of hundredths, so this kind of answer is usually rounded.

So the volume is 1436.03 cubic cm. Cubic, not square — a volume fills a space, and the unit is the quickest way to notice you have answered a surface-area question instead.

Transformations

Transformations on a grid

1.



180° about O

(___, ___)

(–5, –5) → **(5, 5)**

Start where the point is: (–5, –5). The move is 180° about O, and the question is only where those two numbers end up.

Half a turn sends every point straight through the origin and out the other side, the same distance away. Both coordinates keep their size and swap sign.

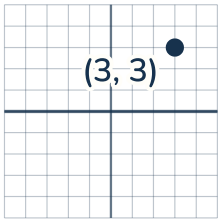
So (–5, –5) lands on (5, 5).

Solutions (6 of 6)

Transformations (continued)

Transformations on a grid (continued)

2.



in the x-axis

(___, ___)

(3, 3)

3 above → **3 below**

(3, 3) → **(3, –3)**

Start where the point is: (3, 3). The move is in the x-axis, and the question is only where those two numbers end up.

A mirror keeps the distance and swaps the side. This point is 3 above the x-axis, so its image is 3 below it.

Nothing moved sideways, so the x-coordinate stays at 3. The image is (3, –3). Notice which number changed: mirroring in the x-axis changes the y.