

Negative Numbers, Powers & BIDMAS: Retrieve and Connects

Contents

Questions and short answers

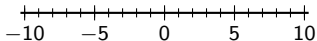
- ▶ Retrieve and Connect 1
- ▶ Retrieve and Connect 2
- ▶ Retrieve and Connect 3
- ▶ Retrieve and Connect 4
- ▶ Retrieve and Connect 5
- ▶ Retrieve and Connect 6
- ▶ Retrieve and Connect 7
- ▶ Retrieve and Connect 8

Worked solutions

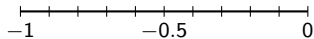
- ▶ Retrieve and Connect 1
- ▶ Retrieve and Connect 2
- ▶ Retrieve and Connect 3
- ▶ Retrieve and Connect 4
- ▶ Retrieve and Connect 5
- ▶ Retrieve and Connect 6
- ▶ Retrieve and Connect 7
- ▶ Retrieve and Connect 8

Retrieve and Connect: Ordering Negative Numbers

Number line A



Number line B



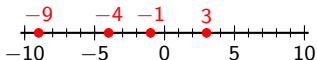
Bus stop for Q3

$$8 \overline{) 7.000}$$

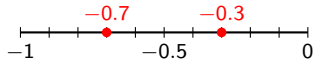
1. 3.8×100
2. $45 \div 1000$
3. Complete the bus stop division to write $\frac{7}{8}$ as a decimal.
4. At midday it is -4°C in Oslo, -9°C in Moscow, 3°C in London and -1°C in Reykjavík. Mark these on number line A. Write them in order, coldest first.
Write $<$ or $>$ in each box.
5. $-9 \underline{\hspace{1cm}} -4$
6. $-1 \underline{\hspace{1cm}} -10$
7. $0 \underline{\hspace{1cm}} -0.5$
8. How many degrees warmer is London than Moscow?
9. Mark -0.3 and -0.7 on number line B. Which is greater?
10. Round -4.7 to the nearest integer.
11. Round -1.46 to 1 decimal place.
12. (Challenge) List the integers n with $-3 < n \leq 1$.

Retrieve and Connect: Ordering Negative Numbers

Number line A



Number line B



Bus stop for Q3

$$\begin{array}{r} 0.875 \\ 8 \overline{) 7.706040} \end{array}$$

- $3.8 \times 100 = 380$
- $45 \div 1000 = 0.045$
- Complete the bus stop division to write $\frac{7}{8}$ as a decimal. **0.875**
- At midday it is -4°C in Oslo, -9°C in Moscow, 3°C in London and -1°C in Reykjavík. Mark these on number line A. Write them in order, coldest first. **-9 , -4 , -1 , 3**
Write $<$ or $>$ in each box.
- $-9 < -4$
- $-1 > -10$
- $0 > -0.5$
- How many degrees warmer is London than Moscow? **12 degrees**
- Mark -0.3 and -0.7 on number line B. Which is greater? **-0.3 , because it is further right**
- Round -4.7 to the nearest integer. **-5**
- Round -1.46 to 1 decimal place. **-1.5**
- (Challenge) List the integers n with $-3 < n \leq 1$. **-2 , -1 , 0 , 1**

Worked Solution: Retrieve and Connect 1, Question 1

Question: 3.8×100

Worked Solution: Retrieve and Connect 1, Question 1

Question: 3.8×100

Solution: $3.8 \times 100 = 380$.

Multiplying by 100 shifts the digits two places to the left.

Worked Solution: Retrieve and Connect 1, Question 2

Question: $45 \div 1000$

Worked Solution: Retrieve and Connect 1, Question 2

Question: $45 \div 1000$

Solution: $45 \div 1000 = 0.045$.

Dividing by 1000 shifts the digits three places to the right.

Worked Solution: Retrieve and Connect 1, Question 3

Question: Complete the bus stop division to write $\frac{7}{8}$ as a decimal.

Worked Solution: Retrieve and Connect 1, Question 3

Question: Complete the bus stop division to write $\frac{7}{8}$ as a decimal.

Solution: $7 \div 8 = 0.875$.

Bus stop: 8 into 7 goes 0 remainder 7; 8 into 70 goes 8 remainder 6; 8 into 60 goes 7 remainder 4; 8 into 40 goes 5 remainder 0.

Worked Solution: Retrieve and Connect 1, Question 4

Question: At midday it is -4°C in Oslo, -9°C in Moscow, 3°C in London and -1°C in Reykjavík. Write them in order, coldest first.

Worked Solution: Retrieve and Connect 1, Question 4

Question: At midday it is -4°C in Oslo, -9°C in Moscow, 3°C in London and -1°C in Reykjavík. Write them in order, coldest first.

Solution: Coldest is furthest left on the number line.

Order: -9°C , -4°C , -1°C , 3°C .

Worked Solution: Retrieve and Connect 1, Question 5

Question: Write $<$ or $>$: $-9\square - 4$.

Worked Solution: Retrieve and Connect 1, Question 5

Question: Write $<$ or $>$: $-9 \square -4$.

Solution: $-9 < -4$.

-9 is further left than -4 on the number line, so it is smaller.

Worked Solution: Retrieve and Connect 1, Question 6

Question: Write $<$ or $>$: $-1\square - 10$.

Worked Solution: Retrieve and Connect 1, Question 6

Question: Write $<$ or $>$: $-1 \square -10$.

Solution: $-1 > -10$.

-1 is further right than -10 , so it is greater.

Worked Solution: Retrieve and Connect 1, Question 7

Question: Write $<$ or $>$: $0\Box - 0.5$.

Worked Solution: Retrieve and Connect 1, Question 7

Question: Write $<$ or $>$: $0 \square -0.5$.

Solution: $0 > -0.5$.

0 is greater than any negative number.

Worked Solution: Retrieve and Connect 1, Question 8

Question: How many degrees warmer is London than Moscow?

Worked Solution: Retrieve and Connect 1, Question 8

Question: How many degrees warmer is London than Moscow?

Solution: London is 3°C , Moscow is -9°C .

Difference $= 3 - (-9) = 3 + 9 = 12$ degrees.

Worked Solution: Retrieve and Connect 1, Question 9

Question: Mark -0.3 and -0.7 on number line B. Which is greater?

Worked Solution: Retrieve and Connect 1, Question 9

Question: Mark -0.3 and -0.7 on number line B. Which is greater?

Solution: -0.3 is to the right of -0.7 on the number line.
Therefore $-0.3 > -0.7$, so -0.3 is greater.

Worked Solution: Retrieve and Connect 1, Question 10

Question: Round -4.7 to the nearest integer.

Worked Solution: Retrieve and Connect 1, Question 10

Question: Round -4.7 to the nearest integer.

Solution: -4.7 is between -5 and -4 .

It is closer to -5 , so rounded to the nearest integer it is -5 .

Worked Solution: Retrieve and Connect 1, Question 11

Question: Round -1.46 to 1 decimal place.

Worked Solution: Retrieve and Connect 1, Question 11

Question: Round -1.46 to 1 decimal place.

Solution: The first decimal place is 4. The next digit is 6, so round up.
 -1.46 rounded to 1 d.p. is -1.5 .

Worked Solution: Retrieve and Connect 1, Question 12

Question: (Challenge) List the integers n with $-3 < n \leq 1$.

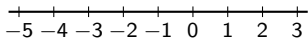
Worked Solution: Retrieve and Connect 1, Question 12

Question: (Challenge) List the integers n with $-3 < n \leq 1$.

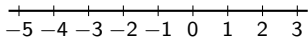
Solution: We need integers greater than -3 and less than or equal to 1 . These are $-2, -1, 0, 1$.

Retrieve and Connect: Adding & Subtracting Across Zero

Number line A



Number line B



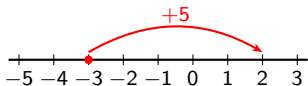
Bus stop for Q3

$$\begin{array}{r} 3 \overline{) 2.0000} \end{array}$$

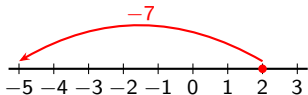
1. $12.4 - 3.75$
 2. Round 6.349 to 1 decimal place.
 3. Complete the bus stop division for $2 \div 3$. What do you notice? Write the answer with a recurring dot, and to 2 decimal places.
 4. Work out $-3 + 5$ by drawing the jump on number line A.
 5. Work out $2 - 7$ by drawing the jump on number line B.
 6. $-6 + 4$
 7. $-2 - 5$
 8. $-8 + 8$
 9. The temperature is -4°C . It rises by 7 degrees, then falls by 10 degrees. What is the temperature now?
 10. Amir has £3.50 in his bank account. He spends £5.20. What is his balance now?
 11. $-2.5 + 1.2$
 12. $-0.6 - 0.8$
- (Challenge) Find the missing numbers.
13. $-3 + \underline{\quad} = 4.5$
 14. $\underline{\quad} - 6 = -2$

Retrieve and Connect: Adding & Subtracting Across Zero

Number line A



Number line B



Bus stop for Q3

$$\begin{array}{r} 0.6666\dots \\ 3 \overline{) 2.202020} \end{array}$$

1. $12.4 - 3.75 = 8.65$
2. Round 6.349 to 1 decimal place. 6.3
3. Complete the bus stop division for $2 \div 3$. What do you notice? Write the answer with a recurring dot, and to 2 decimal places. **The remainder is always 2.** $0.\dot{6} \approx 0.67$
4. Work out $-3 + 5$ by drawing the jump on number line A. 2
5. Work out $2 - 7$ by drawing the jump on number line B. -5
6. $-6 + 4 = -2$
7. $-2 - 5 = -7$
8. $-8 + 8 = 0$
9. The temperature is -4°C . It rises by 7 degrees, then falls by 10 degrees. What is the temperature now? $-4 + 7 - 10 = -7$, so -7°C
10. Amir has £3.50 in his bank account. He spends £5.20. What is his balance now?
 $5.20 - 3.50 = 1.70$, so his balance is $-\text{£}1.70$
11. $-2.5 + 1.2 = -1.3$
12. $-0.6 - 0.8 = -1.4$
- (Challenge) Find the missing numbers.
13. $-3 + 7.5 = 4.5$
14. $4 - 6 = -2$

Worked Solution: Retrieve and Connect 2, Question 1

Question: $12.4 - 3.75$

Worked Solution: Retrieve and Connect 2, Question 1

Question: $12.4 - 3.75$

Solution: Write 12.4 as 12.40.

$$12.40 - 3.75 = 8.65.$$

Worked Solution: Retrieve and Connect 2, Question 2

Question: Round 6.349 to 1 decimal place.

Worked Solution: Retrieve and Connect 2, Question 2

Question: Round 6.349 to 1 decimal place.

Solution: The first decimal place is 3. The next digit is 4, so round down.
6.349 rounded to 1 d.p. is 6.3.

Worked Solution: Retrieve and Connect 2, Question 3

Question: Complete the bus stop division for $2 \div 3$. What do you notice?
Write the answer with a recurring dot, and to 2 decimal places.

Worked Solution: Retrieve and Connect 2, Question 3

Question: Complete the bus stop division for $2 \div 3$. What do you notice?
Write the answer with a recurring dot, and to 2 decimal places.

Solution: $2 \div 3 = 0.666\dots$

The remainder is always 2.

With a recurring dot: $0.\dot{6}$. To 2 d.p.: 0.67.

Worked Solution: Retrieve and Connect 2, Question 4

Question: Work out $-3 + 5$ by drawing the jump on number line A.

Worked Solution: Retrieve and Connect 2, Question 4

Question: Work out $-3 + 5$ by drawing the jump on number line A.

Solution: Start at -3 and jump 5 to the right.

Landing at 2, so $-3 + 5 = 2$.

Worked Solution: Retrieve and Connect 2, Question 5

Question: Work out $2 - 7$ by drawing the jump on number line B.

Worked Solution: Retrieve and Connect 2, Question 5

Question: Work out $2 - 7$ by drawing the jump on number line B.

Solution: Start at 2 and jump 7 to the left.

Landing at -5 , so $2 - 7 = -5$.

Worked Solution: Retrieve and Connect 2, Question 6

Question: $-6 + 4$

Worked Solution: Retrieve and Connect 2, Question 6

Question: $-6 + 4$

Solution: $-6 + 4 = -2$.

Start at -6 and move 4 right.

Worked Solution: Retrieve and Connect 2, Question 7

Question: $-2 - 5$

Worked Solution: Retrieve and Connect 2, Question 7

Question: $-2 - 5$

Solution: $-2 - 5 = -7$.

Start at -2 and move 5 left.

Worked Solution: Retrieve and Connect 2, Question 8

Question: $-8 + 8$

Worked Solution: Retrieve and Connect 2, Question 8

Question: $-8 + 8$

Solution: $-8 + 8 = 0$.

A number plus its opposite is 0.

Worked Solution: Retrieve and Connect 2, Question 9

Question: The temperature is -4°C . It rises by 7 degrees, then falls by 10 degrees. What is the temperature now?

Worked Solution: Retrieve and Connect 2, Question 9

Question: The temperature is -4°C . It rises by 7 degrees, then falls by 10 degrees. What is the temperature now?

Solution: Start at -4 . Rise 7: $-4 + 7 = 3$. Fall 10: $3 - 10 = -7$.
So the temperature is -7°C .

Worked Solution: Retrieve and Connect 2, Question 10

Question: Amir has £3.50 in his bank account. He spends £5.20. What is his balance now?

Worked Solution: Retrieve and Connect 2, Question 10

Question: Amir has £3.50 in his bank account. He spends £5.20. What is his balance now?

Solution: $3.50 - 5.20 = -1.70$.

His balance is $-\text{£}1.70$ (he is overdrawn by £1.70).

Worked Solution: Retrieve and Connect 2, Question 11

Question: $-2.5 + 1.2$

Worked Solution: Retrieve and Connect 2, Question 11

Question: $-2.5 + 1.2$

Solution: $-2.5 + 1.2 = -1.3$.

Move 1.2 right from -2.5 .

Worked Solution: Retrieve and Connect 2, Question 12

Question: $-0.6 - 0.8$

Worked Solution: Retrieve and Connect 2, Question 12

Question: $-0.6 - 0.8$

Solution: $-0.6 - 0.8 = -1.4$.

Move 0.8 left from -0.6 .

Worked Solution: Retrieve and Connect 2, Question 13

Question: (Challenge) $-3 + ? = 4.5$

Worked Solution: Retrieve and Connect 2, Question 13

Question: (Challenge) $-3 + ? = 4.5$

Solution: The missing number is $4.5 - (-3) = 4.5 + 3 = 7.5$.

Worked Solution: Retrieve and Connect 2, Question 14

Question: (Challenge) $? - 6 = -2$

Worked Solution: Retrieve and Connect 2, Question 14

Question: (Challenge) $? - 6 = -2$

Solution: The missing number is $-2 + 6 = 4$.

Retrieve and Connect: Adding & Subtracting Negatives

Three baguettes



Pattern for Q4

$$5 - 2 = 3$$

$$5 - 1 = \underline{\quad}$$

$$5 - 0 = \underline{\quad}$$

$$5 - (-1) = \underline{\quad}$$

$$5 - (-2) = \underline{\quad}$$

1. $-4 + 9$

2. $-4 - 9$

3. $6.05 - 2.8$

4. Complete the pattern on the left. What is subtracting -1 the same as?

5. $6 + (-4)$

6. $-3 - (-8)$

7. It is 5°C at the foot of a mountain and -12°C at the top. How much colder is the top? Write this as a subtraction.

8. Three baguettes are shared equally between teachers A, B, C and D. Show on the diagram how to cut them. What fraction of a baguette does each teacher get?

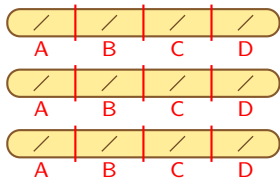
9. Write $3 \div 4$ as a fraction.

10. Write $3 \div 4$ as a decimal.

11. (Challenge) Seven baguettes are shared equally between three teachers. Write each share as a division, a fraction and a recurring decimal.

Retrieve and Connect: Adding & Subtracting Negatives

Three baguettes



Pattern for Q4

$$5 - 2 = 3$$

$$5 - 1 = 4$$

$$5 - 0 = 5$$

$$5 - (-1) = 6$$

$$5 - (-2) = 7$$

1. $-4 + 9 = 5$ 2. $-4 - 9 = -13$ 3. $6.05 - 2.8 = 3.25$

4. Complete the pattern on the left. What is subtracting -1 the same as? **Adding 1**

5. $6 + (-4) = 6 - 4 = 2$ 6. $-3 - (-8) = -3 + 8 = 5$

7. It is 5°C at the foot of a mountain and -12°C at the top. How much colder is the top? Write this as a subtraction. **$5 - (-12) = 17$ degrees**

8. Three baguettes are shared equally between teachers A, B, C and D. Show on the diagram how to cut them. What fraction of a baguette does each teacher get? **Three quarters of a baguette**

9. Write $3 \div 4$ as a fraction. **$\frac{3}{4}$** 10. Write $3 \div 4$ as a decimal. **0.75**

11. (Challenge) Seven baguettes are shared equally between three teachers. Write each share as a division, a fraction and a recurring decimal.

$$7 \div 3 = \frac{7}{3} = 2.\dot{3}$$

Worked Solution: Retrieve and Connect 3, Question 1

Question: $-4 + 9$

Worked Solution: Retrieve and Connect 3, Question 1

Question: $-4 + 9$

Solution: $-4 + 9 = 5$.

Start at -4 and move 9 right.

Worked Solution: Retrieve and Connect 3, Question 2

Question: $-4 - 9$

Worked Solution: Retrieve and Connect 3, Question 2

Question: $-4 - 9$

Solution: $-4 - 9 = -13$.

Start at -4 and move 9 left.

Worked Solution: Retrieve and Connect 3, Question 3

Question: $6.05 - 2.8$

Worked Solution: Retrieve and Connect 3, Question 3

Question: $6.05 - 2.8$

Solution: Write 2.8 as 2.80.

$$6.05 - 2.80 = 3.25.$$

Worked Solution: Retrieve and Connect 3, Question 4

Question: Complete the pattern: $5 - 2 = 3$, $5 - 1 = 4$, $5 - 0 = 5$,
 $5 - (-1) = \square$, $5 - (-2) = \square$. What is subtracting -1 the same as?

Worked Solution: Retrieve and Connect 3, Question 4

Question: Complete the pattern: $5 - 2 = 3$, $5 - 1 = 4$, $5 - 0 = 5$, $5 - (-1) = \square$, $5 - (-2) = \square$. What is subtracting -1 the same as?

Solution: The pattern increases by 1 each time.

$$5 - (-1) = 6, 5 - (-2) = 7.$$

Subtracting -1 is the same as adding 1.

Worked Solution: Retrieve and Connect 3, Question 5

Question: $6 + (-4)$

Worked Solution: Retrieve and Connect 3, Question 5

Question: $6 + (-4)$

Solution: $6 + (-4) = 6 - 4 = 2$.

Adding a negative is the same as subtracting.

Worked Solution: Retrieve and Connect 3, Question 6

Question: $-3 - (-8)$

Worked Solution: Retrieve and Connect 3, Question 6

Question: $-3 - (-8)$

Solution: $-3 - (-8) = -3 + 8 = 5.$

Subtracting a negative is the same as adding.

Worked Solution: Retrieve and Connect 3, Question 7

Question: It is 5°C at the foot of a mountain and -12°C at the top. How much colder is the top? Write this as a subtraction.

Worked Solution: Retrieve and Connect 3, Question 7

Question: It is 5°C at the foot of a mountain and -12°C at the top. How much colder is the top? Write this as a subtraction.

Solution: Difference = $5 - (-12) = 5 + 12 = 17$.

The top is 17 degrees colder.

Worked Solution: Retrieve and Connect 3, Question 8

Question: Three baguettes are shared equally between teachers A, B, C and D. Show on the diagram how to cut them. What fraction of a baguette does each teacher get?

Worked Solution: Retrieve and Connect 3, Question 8

Question: Three baguettes are shared equally between teachers A, B, C and D. Show on the diagram how to cut them. What fraction of a baguette does each teacher get?

Solution: Cut each baguette into 4 equal quarters. Each teacher gets 3 quarters, which is $\frac{3}{4}$ of a baguette.

Worked Solution: Retrieve and Connect 3, Question 9

Question: Write $3 \div 4$ as a fraction.

Worked Solution: Retrieve and Connect 3, Question 9

Question: Write $3 \div 4$ as a fraction.

Solution: $3 \div 4 = \frac{3}{4}$.

Worked Solution: Retrieve and Connect 3, Question 10

Question: Write $3 \div 4$ as a decimal.

Worked Solution: Retrieve and Connect 3, Question 10

Question: Write $3 \div 4$ as a decimal.

Solution: $3 \div 4 = 0.75$.

Worked Solution: Retrieve and Connect 3, Question 11

Question: (Challenge) Seven baguettes are shared equally between three teachers. Write each share as a division, a fraction and a recurring decimal.

Worked Solution: Retrieve and Connect 3, Question 11

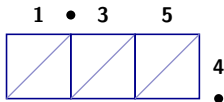
Question: (Challenge) Seven baguettes are shared equally between three teachers. Write each share as a division, a fraction and a recurring decimal.

Solution: $7 \div 3 = \frac{7}{3} = 2.333\dots = 2.\dot{3}$.

Each teacher gets $2.\dot{3}$ baguettes.

Retrieve and Connect: Multiplying & Dividing Negatives

Lattice for Q9



_____ or _____

Scaling to whole numbers

$$1.35 \times 100 = 135$$

$$135 \times 4 = \underline{\hspace{2cm}}$$

We multiplied by 100, so

$$1.35 \times 4 = \underline{\hspace{2cm}}$$

Pattern for Q4

$$(-3) \times 2 = -6$$

$$(-3) \times 1 = -3$$

$$(-3) \times 0 = \underline{\hspace{1cm}}$$

$$(-3) \times (-1) = \underline{\hspace{1cm}}$$

$$(-3) \times (-2) = \underline{\hspace{1cm}}$$

1. $-7 + 3$

2. $4 - (-6)$

3. Use bus stop division to work out $5 \div 6$.

4. Complete the pattern on the left. Is a negative number multiplied by a negative number positive or negative?

5. $5 \times (-4)$

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

7. $-20 \div 5$

8. $-18 \div (-2)$

9. Find the cost of 4 baguettes at £1.35 each. Use one of the two methods on the left.

10. The staff room fund has £5.00, and pays for the four baguettes. What is its balance now?

11. $-4.8 \div 0.6 = \frac{-4.8}{0.6} = \frac{-4.8 \times 10}{0.6 \times 10} = \frac{\underline{\hspace{1cm}}}{\underline{\hspace{1cm}}} = \underline{\hspace{1cm}}$

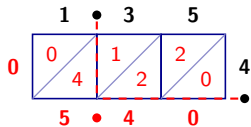
(Challenge)

12. $(-0.3) \times (-0.4)$

13. $-1.2 \div (-0.04)$

Retrieve and Connect: Multiplying & Dividing Negatives

Lattice for Q9



or

Scaling to whole numbers

$$1.35 \times 100 = 135$$

$$135 \times 4 = 540$$

We multiplied by 100, so

$$1.35 \times 4 = 5.40$$

Pattern for Q4

$$(-3) \times 2 = -6$$

$$(-3) \times 1 = -3$$

$$(-3) \times 0 = 0$$

$$(-3) \times (-1) = 3$$

$$(-3) \times (-2) = 6$$

$$1. -7 + 3 = -4$$

$$2. 4 - (-6) = 10$$

$$3. \text{ Use bus stop division to work out } 5 \div 6. \text{ } 0.8\bar{3}$$

$$4. \text{ Complete the pattern on the left. Is a negative number multiplied by a negative number positive or negative? Positive}$$

$$5. 5 \times (-4) = -20$$

$$6. (-6) \times (-3) = 18$$

$$7. -20 \div 5 = -4$$

$$8. -18 \div (-2) = 9$$

$$9. \text{ Find the cost of 4 baguettes at } \pounds 1.35 \text{ each. Use one of the two methods on the left. } \pounds 5.40$$

$$10. \text{ The staff room fund has } \pounds 5.00, \text{ and pays for the four baguettes. What is its balance now?}$$

$$5.00 - 5.40 = -0.40, \text{ so } -\pounds 0.40$$

$$11. -4.8 \div 0.6 = \frac{-4.8}{0.6} = \frac{-4.8 \times 10}{0.6 \times 10} = \frac{-48}{6} = -8$$

(Challenge)

$$12. (-0.3) \times (-0.4) = 0.12$$

$$13. -1.2 \div (-0.04) = \frac{-120}{-4} = 30$$

Worked Solution: Retrieve and Connect 4, Question 1

Question: $-7 + 3$

Worked Solution: Retrieve and Connect 4, Question 1

Question: $-7 + 3$

Solution: $-7 + 3 = -4$.

Start at -7 and move 3 right.

Worked Solution: Retrieve and Connect 4, Question 2

Question: $4 - (-6)$

Worked Solution: Retrieve and Connect 4, Question 2

Question: $4 - (-6)$

Solution: $4 - (-6) = 4 + 6 = 10$.

Subtracting a negative is the same as adding.

Worked Solution: Retrieve and Connect 4, Question 3

Question: Use bus stop division to work out $5 \div 6$.

Worked Solution: Retrieve and Connect 4, Question 3

Question: Use bus stop division to work out $5 \div 6$.

Solution: $5 \div 6 = 0.8333 \dots$

The remainder repeats, so $5 \div 6 = 0.8\dot{3}$.

Worked Solution: Retrieve and Connect 4, Question 4

Question: Complete the pattern: $(-3) \times 2 = -6$, $(-3) \times 1 = -3$,
 $(-3) \times 0 = \square$, $(-3) \times (-1) = \square$, $(-3) \times (-2) = \square$. Is a negative number multiplied by a negative number positive or negative?

Worked Solution: Retrieve and Connect 4, Question 4

Question: Complete the pattern: $(-3) \times 2 = -6$, $(-3) \times 1 = -3$, $(-3) \times 0 = \square$, $(-3) \times (-1) = \square$, $(-3) \times (-2) = \square$. Is a negative number multiplied by a negative number positive or negative?

Solution: The pattern increases by 3 each time.

$$(-3) \times 0 = 0, (-3) \times (-1) = 3, (-3) \times (-2) = 6.$$

A negative times a negative is positive.

Worked Solution: Retrieve and Connect 4, Question 5

Question: $5 \times (-4)$

Worked Solution: Retrieve and Connect 4, Question 5

Question: $5 \times (-4)$

Solution: $5 \times (-4) = -20$.

Positive times negative gives a negative.

Worked Solution: Retrieve and Connect 4, Question 6

Question: $(-6) \times (-3)$

Worked Solution: Retrieve and Connect 4, Question 6

Question: $(-6) \times (-3)$

Solution: $(-6) \times (-3) = 18$.

Negative times negative gives a positive.

Worked Solution: Retrieve and Connect 4, Question 7

Question: $-20 \div 5$

Worked Solution: Retrieve and Connect 4, Question 7

Question: $-20 \div 5$

Solution: $-20 \div 5 = -4$.

Negative divided by positive gives a negative.

Worked Solution: Retrieve and Connect 4, Question 8

Question: $-18 \div (-2)$

Worked Solution: Retrieve and Connect 4, Question 8

Question: $-18 \div (-2)$

Solution: $-18 \div (-2) = 9$.

Negative divided by negative gives a positive.

Worked Solution: Retrieve and Connect 4, Question 9

Question: Find the cost of 4 baguettes at £1.35 each. Use one of the two methods on the left.

Worked Solution: Retrieve and Connect 4, Question 9

Question: Find the cost of 4 baguettes at £1.35 each. Use one of the two methods on the left.

Solution: Scaling method: $1.35 \times 100 = 135$, $135 \times 4 = 540$, so

$1.35 \times 4 = 5.40$.

Cost is £5.40.

Worked Solution: Retrieve and Connect 4, Question 10

Question: The staff room fund has £5.00, and pays for the four baguettes. What is its balance now?

Worked Solution: Retrieve and Connect 4, Question 10

Question: The staff room fund has £5.00, and pays for the four baguettes. What is its balance now?

Solution: $5.00 - 5.40 = -0.40$.

The balance is $-\text{£}0.40$.

Worked Solution: Retrieve and Connect 4, Question 11

Question: $-4.8 \div 0.6 = \frac{-4.8}{0.6} = \frac{-4.8 \times 10}{0.6 \times 10} = \frac{\square}{\square} = \square$

Worked Solution: Retrieve and Connect 4, Question 11

Question: $-4.8 \div 0.6 = \frac{-4.8}{0.6} = \frac{-4.8 \times 10}{0.6 \times 10} = \frac{\square}{\square} = \square$

Solution: Multiply numerator and denominator by 10:

$$\frac{-4.8 \times 10}{0.6 \times 10} = \frac{-48}{6} = -8.$$

Worked Solution: Retrieve and Connect 4, Question 12

Question: (Challenge) $(-0.3) \times (-0.4)$

Worked Solution: Retrieve and Connect 4, Question 12

Question: (Challenge) $(-0.3) \times (-0.4)$

Solution: $(-0.3) \times (-0.4) = 0.12$.

Negative times negative is positive.

Worked Solution: Retrieve and Connect 4, Question 13

Question: (Challenge) $-1.2 \div (-0.04)$

Worked Solution: Retrieve and Connect 4, Question 13

Question: (Challenge) $-1.2 \div (-0.04)$

Solution: $-1.2 \div (-0.04) = \frac{-1.2}{-0.04} = \frac{-120}{-4} = 30.$

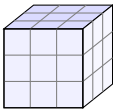
Retrieve and Connect: Squares, Cubes & Roots

Square A



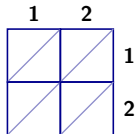
?

Cube B



3 cm

Lattice for Q10



_____ or _____

Scaling to whole numbers

$$1.2 \times 10 = 12$$

$$12 \times 12 = \underline{\hspace{2cm}}$$

We multiplied by 10×10 , so

$$1.2^2 = \underline{\hspace{2cm}}$$

1. $(-4) \times (-5)$
2. $-24 \div 6$
3. Round 7.482 to 1 d.p.
4. Square A has area 49 cm^2 . Find its side length, using $\sqrt{\hspace{1cm}}$.
5. Cube B is made of centimetre cubes. Find its volume, written as a power.
6. 6^2
7. 4^3
8. $\sqrt{81}$
9. $\sqrt[3]{1000}$
10. Work out $1.2^2 = 1.2 \times 1.2$ using one method on the left. On the lattice, mark the decimal points yourself.
11. $(-3)^2$
12. $(-2)^3$
13. (Challenge) Find two numbers whose square is 64.
14. (Challenge) Is there a number whose square is -64 ?

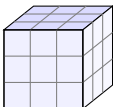
Retrieve and Connect: Squares, Cubes & Roots

Square A



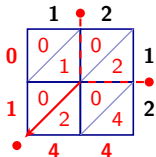
7 cm

Cube B



3 cm

Lattice for Q10



or

Scaling to whole numbers

$$1.2 \times 10 = 12$$

$$12 \times 12 = 144$$

We multiplied by 10×10 , so

$$1.2^2 = 1.44$$

$$1. (-4) \times (-5) = 20 \quad 2. -24 \div 6 = -4 \quad 3. \text{Round } 7.482 \text{ to 1 d.p. } 7.5$$

$$4. \text{ Square A has area } 49 \text{ cm}^2. \text{ Find its side length, using } \sqrt{}. \sqrt{49} = 7 \text{ cm}$$

$$5. \text{ Cube B is made of centimetre cubes. Find its volume, written as a power. } 3^3 = 27 \text{ cm}^3$$

$$6. 6^2 = 36 \quad 7. 4^3 = 64 \quad 8. \sqrt{81} = 9 \quad 9. \sqrt[3]{1000} = 10$$

$$10. \text{ Work out } 1.2^2 = 1.2 \times 1.2 \text{ using one method on the left. On the lattice, mark the decimal points yourself. } 1.44$$

$$11. (-3)^2 = 9 \quad 12. (-2)^3 = -8$$

$$13. \text{ (Challenge) Find two numbers whose square is 64. } 8 \text{ and } -8 \quad 14. \text{ (Challenge) Is there a number whose square is } -64? \text{ No: a square is never negative.}$$

Worked Solution: Retrieve and Connect 5, Question 1

Question: $(-4) \times (-5)$

Worked Solution: Retrieve and Connect 5, Question 1

Question: $(-4) \times (-5)$

Solution: $(-4) \times (-5) = 20$.

Negative times negative is positive.

Worked Solution: Retrieve and Connect 5, Question 2

Question: $-24 \div 6$

Worked Solution: Retrieve and Connect 5, Question 2

Question: $-24 \div 6$

Solution: $-24 \div 6 = -4$.

Negative divided by positive is negative.

Worked Solution: Retrieve and Connect 5, Question 3

Question: Round 7.482 to 1 d.p.

Worked Solution: Retrieve and Connect 5, Question 3

Question: Round 7.482 to 1 d.p.

Solution: The first decimal place is 4. The next digit is 8, so round up.
7.482 rounded to 1 d.p. is 7.5.

Worked Solution: Retrieve and Connect 5, Question 4

Question: Square A has area 49 cm^2 . Find its side length, using $\sqrt{}$.

Worked Solution: Retrieve and Connect 5, Question 4

Question: Square A has area 49 cm^2 . Find its side length, using $\sqrt{}$.

Solution: The side length is $\sqrt{49} = 7 \text{ cm}$.

Worked Solution: Retrieve and Connect 5, Question 5

Question: Cube B is made of centimetre cubes. Find its volume, written as a power.

Worked Solution: Retrieve and Connect 5, Question 5

Question: Cube B is made of centimetre cubes. Find its volume, written as a power.

Solution: The cube is 3 by 3 by 3, so volume = $3^3 = 27 \text{ cm}^3$.

Worked Solution: Retrieve and Connect 5, Question 6

Question: 6^2

Worked Solution: Retrieve and Connect 5, Question 6

Question: 6^2

Solution: $6^2 = 36$.

Worked Solution: Retrieve and Connect 5, Question 7

Question: 4^3

Worked Solution: Retrieve and Connect 5, Question 7

Question: 4^3

Solution: $4^3 = 4 \times 4 \times 4 = 64$.

Worked Solution: Retrieve and Connect 5, Question 8

Question: $\sqrt{81}$

Worked Solution: Retrieve and Connect 5, Question 8

Question: $\sqrt{81}$

Solution: $\sqrt{81} = 9$, because $9 \times 9 = 81$.

Worked Solution: Retrieve and Connect 5, Question 9

Question: $\sqrt[3]{1000}$

Worked Solution: Retrieve and Connect 5, Question 9

Question: $\sqrt[3]{1000}$

Solution: $\sqrt[3]{1000} = 10$, because $10^3 = 1000$.

Worked Solution: Retrieve and Connect 5, Question 10

Question: Work out $1.2^2 = 1.2 \times 1.2$ using one method on the left. On the lattice, mark the decimal points yourself.

Worked Solution: Retrieve and Connect 5, Question 10

Question: Work out $1.2^2 = 1.2 \times 1.2$ using one method on the left. On the lattice, mark the decimal points yourself.

Solution: Using scaling: $1.2 \times 10 = 12$, $12 \times 12 = 144$.
We multiplied by $10 \times 10 = 100$, so $1.2^2 = 1.44$.

Worked Solution: Retrieve and Connect 5, Question 11

Question: $(-3)^2$

Worked Solution: Retrieve and Connect 5, Question 11

Question: $(-3)^2$

Solution: $(-3)^2 = (-3) \times (-3) = 9.$

Worked Solution: Retrieve and Connect 5, Question 12

Question: $(-2)^3$

Worked Solution: Retrieve and Connect 5, Question 12

Question: $(-2)^3$

Solution: $(-2)^3 = (-2) \times (-2) \times (-2) = 4 \times (-2) = -8.$

Worked Solution: Retrieve and Connect 5, Question 13

Question: (Challenge) Find two numbers whose square is 64.

Worked Solution: Retrieve and Connect 5, Question 13

Question: (Challenge) Find two numbers whose square is 64.

Solution: The numbers are 8 and -8 , because $8^2 = 64$ and $(-8)^2 = 64$.

Worked Solution: Retrieve and Connect 5, Question 14

Question: (Challenge) Is there a number whose square is -64 ?

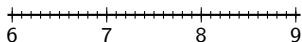
Worked Solution: Retrieve and Connect 5, Question 14

Question: (Challenge) Is there a number whose square is -64 ?

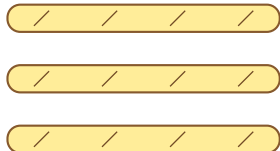
Solution: No. The square of any real number is never negative.

Retrieve and Connect: Powers & Estimating Roots

Number line A



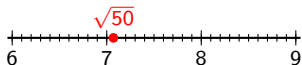
Three baguettes



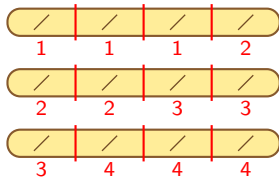
1. 7^2
2. $\sqrt{144}$
3. $-2.4 + 5$
4. $-3 \times (-1.5)$
5. Write $2 \times 2 \times 2 \times 2 \times 2$ as a power, and work it out. Write $<$ or $>$ between 2^5 and 5^2 .
6. 10^4
7. 3.7×10^3
8. Complete $_ < \sqrt{50} < _$, and mark $\sqrt{50}$ on number line A.
9. 0.7^2
10. $\sqrt{0.49}$
11. Each teacher eats 0.75 of a baguette. Show on the diagram how many teachers 3 baguettes can feed.
$$3 \div 0.75 = \frac{3}{0.75} = \frac{\quad}{\quad} = _$$
12. (Challenge) A baguette is 0.6 m long. Each teacher's portion is 0.15 m long. How many portions can be cut from 3 baguettes?

Retrieve and Connect: Powers & Estimating Roots

Number line A



Three baguettes



1. $7^2 = 49$
2. $\sqrt{144} = 12$
3. $-2.4 + 5 = 2.6$
4. $-3 \times (-1.5) = 4.5$
5. Write $2 \times 2 \times 2 \times 2 \times 2$ as a power, and work it out.
Write $<$ or $>$ between 2^5 and 5^2 . $2^5 = 32 > 25$
6. $10^4 = 10\,000$
7. $3.7 \times 10^3 = 3700$
8. Complete $7 < \sqrt{50} < 8$, and mark $\sqrt{50}$ on number line A. **Just above 7, as 50 is near 49**
9. $0.7^2 = 0.49$
10. $\sqrt{0.49} = 0.7$
11. Each teacher eats 0.75 of a baguette. Show on the diagram how many teachers 3 baguettes can feed.
$$3 \div 0.75 = \frac{3}{0.75} = \frac{300}{75} = 4$$
12. (Challenge) A baguette is 0.6 m long. Each teacher's portion is 0.15 m long. How many portions can be cut from 3 baguettes?
$$0.6 \div 0.15 = \frac{60}{15} = 4; \quad 3 \times 4 = 12 \text{ portions}$$

Worked Solution: Retrieve and Connect 6, Question 1

Question: 7^2

Worked Solution: Retrieve and Connect 6, Question 1

Question: 7^2

Solution: $7^2 = 7 \times 7 = 49$.

Worked Solution: Retrieve and Connect 6, Question 2

Question: $\sqrt{144}$

Worked Solution: Retrieve and Connect 6, Question 2

Question: $\sqrt{144}$

Solution: $\sqrt{144} = 12$, because $12 \times 12 = 144$.

Worked Solution: Retrieve and Connect 6, Question 3

Question: $-2.4 + 5$

Worked Solution: Retrieve and Connect 6, Question 3

Question: $-2.4 + 5$

Solution: $-2.4 + 5 = 2.6$.

Start at -2.4 and move 5 right.

Worked Solution: Retrieve and Connect 6, Question 4

Question: $-3 \times (-1.5)$

Worked Solution: Retrieve and Connect 6, Question 4

Question: $-3 \times (-1.5)$

Solution: $-3 \times (-1.5) = 4.5$.

Negative times negative is positive.

Worked Solution: Retrieve and Connect 6, Question 5

Question: Write $2 \times 2 \times 2 \times 2 \times 2$ as a power, and work it out. Write $<$ or $>$ between 2^5 and 5^2 .

Worked Solution: Retrieve and Connect 6, Question 5

Question: Write $2 \times 2 \times 2 \times 2 \times 2$ as a power, and work it out. Write $<$ or $>$ between 2^5 and 5^2 .

Solution: $2 \times 2 \times 2 \times 2 \times 2 = 2^5 = 32$.

$5^2 = 25$.

$32 > 25$, so $2^5 > 5^2$.

Worked Solution: Retrieve and Connect 6, Question 6

Question: 10^4

Worked Solution: Retrieve and Connect 6, Question 6

Question: 10^4

Solution: $10^4 = 10 \times 10 \times 10 \times 10 = 10\,000$.

Worked Solution: Retrieve and Connect 6, Question 7

Question: 3.7×10^3

Worked Solution: Retrieve and Connect 6, Question 7

Question: 3.7×10^3

Solution: $3.7 \times 10^3 = 3.7 \times 1000 = 3700$.

Worked Solution: Retrieve and Connect 6, Question 8

Question: Complete $7 < \sqrt{50} < 8$, and mark $\sqrt{50}$ on number line A.

Worked Solution: Retrieve and Connect 6, Question 8

Question: Complete $7 < \sqrt{50} < 8$, and mark $\sqrt{50}$ on number line A.

Solution: $7^2 = 49$ and $8^2 = 64$, and 50 is between 49 and 64.
So $\sqrt{50}$ is between 7 and 8, just above 7.

Worked Solution: Retrieve and Connect 6, Question 9

Question: 0.7^2

Worked Solution: Retrieve and Connect 6, Question 9

Question: 0.7^2

Solution: $0.7^2 = 0.7 \times 0.7 = 0.49$.

Worked Solution: Retrieve and Connect 6, Question 10

Question: $\sqrt{0.49}$

Worked Solution: Retrieve and Connect 6, Question 10

Question: $\sqrt{0.49}$

Solution: $\sqrt{0.49} = 0.7$, because $0.7^2 = 0.49$.

Worked Solution: Retrieve and Connect 6, Question 11

Question: Each teacher eats 0.75 of a baguette. Show on the diagram how many teachers 3 baguettes can feed.

Worked Solution: Retrieve and Connect 6, Question 11

Question: Each teacher eats 0.75 of a baguette. Show on the diagram how many teachers 3 baguettes can feed.

$$\text{Solution: } 3 \div 0.75 = \frac{3}{0.75} = \frac{300}{75} = 4.$$

So 3 baguettes can feed 4 teachers.

Worked Solution: Retrieve and Connect 6, Question 12

Question: (Challenge) A baguette is 0.6 m long. Each teacher's portion is 0.15 m long. How many portions can be cut from 3 baguettes?

Worked Solution: Retrieve and Connect 6, Question 12

Question: (Challenge) A baguette is 0.6 m long. Each teacher's portion is 0.15 m long. How many portions can be cut from 3 baguettes?

Solution: One baguette gives $0.6 \div 0.15 = \frac{60}{15} = 4$ portions.
Three baguettes give $3 \times 4 = 12$ portions.

Retrieve and Connect: BIDMAS

Receipt

Staff Room Café	
3 baguettes	£1.20 each
2 coffees	£2.45 each
Total	£ ?

- $4^2 - \sqrt{9}$
- $(-12) \div 2 \times 3$
- $3 + 4 \times 5$
- $(3 + 4) \times 5$
- $20 - 12 \div 3$
- $(20 - 12) \div 3$, as a recurring decimal
- $\frac{18 + 6}{4}$
- $18 + 6 \div 4$
- Three teachers buy the items on the receipt. Write one calculation for the total cost, and work it out.
- They share the cost equally. Write one calculation, with brackets, for each share, to the nearest penny.

(Challenge) Put brackets into $2 + 6 \times 5 - 3$ to make each number.
- 16
- 37

Retrieve and Connect: BIDMAS

Receipt

Staff Room Café	
3 baguettes	£1.20 each
2 coffees	£2.45 each

Total	£8.50

- $4^2 - \sqrt{9}$
 $= 16 - 3 = 13$
- $(-12) \div 2 \times 3$
 $= -6 \times 3 = -18$
- $3 + 4 \times 5$
 $= 3 + 20 = 23$
- $(3 + 4) \times 5$
 $= 7 \times 5 = 35$
- $20 - 12 \div 3$
 $= 20 - 4 = 16$
- $(20 - 12) \div 3$, as a recurring decimal
 $= 8 \div 3 = 2.\dot{6}$
- $\frac{18 + 6}{4} = \frac{24}{4} = 6$
- $18 + 6 \div 4$
 $= 18 + 1.5 = 19.5$
- Three teachers buy the items on the receipt. Write one calculation for the total cost, and work it out.
 $3 \times 1.20 + 2 \times 2.45 = 3.60 + 4.90 = \text{£}8.50$
- They share the cost equally. Write one calculation, with brackets, for each share, to the nearest penny.
 $(3 \times 1.20 + 2 \times 2.45) \div 3 = 2.833... \approx \text{£}2.83$
(Challenge) Put brackets into $2 + 6 \times 5 - 3$ to make each number.
- 16 $(2 + 6) \times (5 - 3)$ 12. 37 $(2 + 6) \times 5 - 3$

Worked Solution: Retrieve and Connect 7, Question 1

Question: $4^2 - \sqrt{9}$

Worked Solution: Retrieve and Connect 7, Question 1

Question: $4^2 - \sqrt{9}$

Solution: $4^2 = 16$ and $\sqrt{9} = 3$.

$16 - 3 = 13$.

Worked Solution: Retrieve and Connect 7, Question 2

Question: $(-12) \div 2 \times 3$

Worked Solution: Retrieve and Connect 7, Question 2

Question: $(-12) \div 2 \times 3$

Solution: Work left to right: $(-12) \div 2 = -6$.
 $-6 \times 3 = -18$.

Worked Solution: Retrieve and Connect 7, Question 3

Question: $3 + 4 \times 5$

Worked Solution: Retrieve and Connect 7, Question 3

Question: $3 + 4 \times 5$

Solution: Multiplication before addition.

$4 \times 5 = 20$, then $3 + 20 = 23$.

Worked Solution: Retrieve and Connect 7, Question 4

Question: $(3 + 4) \times 5$

Worked Solution: Retrieve and Connect 7, Question 4

Question: $(3 + 4) \times 5$

Solution: Brackets first: $3 + 4 = 7$.

$7 \times 5 = 35$.

Worked Solution: Retrieve and Connect 7, Question 5

Question: $20 - 12 \div 3$

Worked Solution: Retrieve and Connect 7, Question 5

Question: $20 - 12 \div 3$

Solution: Division before subtraction.

$12 \div 3 = 4$, then $20 - 4 = 16$.

Worked Solution: Retrieve and Connect 7, Question 6

Question: $(20 - 12) \div 3$, as a recurring decimal

Worked Solution: Retrieve and Connect 7, Question 6

Question: $(20 - 12) \div 3$, as a recurring decimal

Solution: Brackets first: $20 - 12 = 8$.

$$8 \div 3 = 2.666\dots = 2.\dot{6}.$$

Worked Solution: Retrieve and Connect 7, Question 7

Question: $\frac{18 + 6}{4}$

Worked Solution: Retrieve and Connect 7, Question 7

Question: $\frac{18 + 6}{4}$

Solution: The fraction bar means division, so first $18 + 6 = 24$.
 $24 \div 4 = 6$.

Worked Solution: Retrieve and Connect 7, Question 8

Question: $18 + 6 \div 4$

Worked Solution: Retrieve and Connect 7, Question 8

Question: $18 + 6 \div 4$

Solution: Division before addition.

$6 \div 4 = 1.5$, then $18 + 1.5 = 19.5$.

Worked Solution: Retrieve and Connect 7, Question 9

Question: Three teachers buy 3 baguettes at £1.20 each and 2 coffees at £2.45 each. Write one calculation for the total cost, and work it out.

Worked Solution: Retrieve and Connect 7, Question 9

Question: Three teachers buy 3 baguettes at £1.20 each and 2 coffees at £2.45 each. Write one calculation for the total cost, and work it out.

Solution: $\text{Total} = 3 \times 1.20 + 2 \times 2.45.$

$= 3.60 + 4.90 = 8.50.$

Total cost is £8.50.

Worked Solution: Retrieve and Connect 7, Question 10

Question: They share the cost equally. Write one calculation, with brackets, for each share, to the nearest penny.

Worked Solution: Retrieve and Connect 7, Question 10

Question: They share the cost equally. Write one calculation, with brackets, for each share, to the nearest penny.

Solution: Each share = $(3 \times 1.20 + 2 \times 2.45) \div 3$.
 $= 8.50 \div 3 = 2.8333 \dots \approx 2.83$.

Worked Solution: Retrieve and Connect 7, Question 11

Question: (Challenge) Put brackets into $2 + 6 \times 5 - 3$ to make 16.

Worked Solution: Retrieve and Connect 7, Question 11

Question: (Challenge) Put brackets into $2 + 6 \times 5 - 3$ to make 16.

Solution: $(2 + 6) \times (5 - 3) = 8 \times 2 = 16$.

Worked Solution: Retrieve and Connect 7, Question 12

Question: (Challenge) Put brackets into $2 + 6 \times 5 - 3$ to make 37.

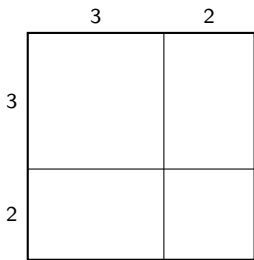
Worked Solution: Retrieve and Connect 7, Question 12

Question: (Challenge) Put brackets into $2 + 6 \times 5 - 3$ to make 37.

Solution: $(2 + 6) \times 5 - 3 = 8 \times 5 - 3 = 40 - 3 = 37$.

Retrieve and Connect: BIDMAS with Powers & Negatives

Square with side $3 + 2$



1. $5 + 3 \times 2.5$

2. $\sqrt{64} - 2^3$

3. -3^2

4. $(-3)^2$

5. Explain why your answers to Q3 and Q4 are different.

6. 2×5^2

7. $(2 \times 5)^2$

8. $(3 + 2)^2$

9. $3^2 + 2^2$

10. Use the diagram to explain why your answers to Q8 and Q9 are different.

11. $\frac{4^2 + 2^3}{-9}$, as a recurring decimal

12. $\sqrt{36 + 64}$

13. $\sqrt{36} + \sqrt{64}$

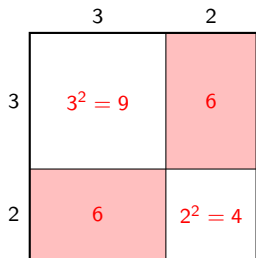
(Challenge) Use 2, 3 and 4 once each, with any operations, powers or brackets, to make each number.

14. -10

15. 36

Retrieve and Connect: BIDMAS with Powers & Negatives

Square with side $3 + 2$



- $5 + 3 \times 2.5 = 5 + 7.5 = 12.5$
- $\sqrt{64} - 2^3 = 8 - 8 = 0$
- $-3^2 = -9$
- $(-3)^2 = 9$
- Explain why your answers to Q3 and Q4 are different. In -3^2 only the 3 is squared.
- $2 \times 5^2 = 2 \times 25 = 50$
- $(2 \times 5)^2 = 10^2 = 100$
- $(3 + 2)^2 = 25$
- $3^2 + 2^2 = 13$
- Use the diagram to explain why your answers to Q8 and Q9 are different. $3^2 + 2^2$ leaves out the two 3×2 rectangles.
- $\frac{4^2 + 2^3}{-9}$, as a recurring decimal $= \frac{24}{-9} = -2.\dot{6}$
- $\sqrt{36 + 64} = \sqrt{100} = 10$
- $\sqrt{36} + \sqrt{64} = 6 + 8 = 14$
- (Challenge) Use 2, 3 and 4 once each, with any operations, powers or brackets, to make each number.
- -10 for example $2 - 3 \times 4$
- 36 for example $3^2 \times 4$

Worked Solution: Retrieve and Connect 8, Question 1

Question: $5 + 3 \times 2.5$

Worked Solution: Retrieve and Connect 8, Question 1

Question: $5 + 3 \times 2.5$

Solution: Multiplication before addition.

$3 \times 2.5 = 7.5$, then $5 + 7.5 = 12.5$.

Worked Solution: Retrieve and Connect 8, Question 2

Question: $\sqrt{64} - 2^3$

Worked Solution: Retrieve and Connect 8, Question 2

Question: $\sqrt{64} - 2^3$

Solution: $\sqrt{64} = 8$ and $2^3 = 8$.

$$8 - 8 = 0.$$

Worked Solution: Retrieve and Connect 8, Question 3

Question: -3^2

Worked Solution: Retrieve and Connect 8, Question 3

Question: -3^2

Solution: The exponent applies only to 3.

$$-3^2 = -(3^2) = -9.$$

Worked Solution: Retrieve and Connect 8, Question 4

Question: $(-3)^2$

Worked Solution: Retrieve and Connect 8, Question 4

Question: $(-3)^2$

Solution: The exponent applies to -3 .

$$(-3)^2 = (-3) \times (-3) = 9.$$

Worked Solution: Retrieve and Connect 8, Question 5

Question: Explain why your answers to Q3 and Q4 are different.

Worked Solution: Retrieve and Connect 8, Question 5

Question: Explain why your answers to Q3 and Q4 are different.

Solution: In -3^2 , only the 3 is squared, so it is $-(3 \times 3) = -9$.

In $(-3)^2$, the whole of -3 is squared, so it is $(-3) \times (-3) = 9$.

Worked Solution: Retrieve and Connect 8, Question 6

Question: 2×5^2

Worked Solution: Retrieve and Connect 8, Question 6

Question: 2×5^2

Solution: $5^2 = 25$.

$2 \times 25 = 50$.

Worked Solution: Retrieve and Connect 8, Question 7

Question: $(2 \times 5)^2$

Worked Solution: Retrieve and Connect 8, Question 7

Question: $(2 \times 5)^2$

Solution: Brackets first: $2 \times 5 = 10$.

$10^2 = 100$.

Worked Solution: Retrieve and Connect 8, Question 8

Question: $(3 + 2)^2$

Worked Solution: Retrieve and Connect 8, Question 8

Question: $(3 + 2)^2$

Solution: Brackets first: $3 + 2 = 5$.

$$5^2 = 25.$$

Worked Solution: Retrieve and Connect 8, Question 9

Question: $3^2 + 2^2$

Worked Solution: Retrieve and Connect 8, Question 9

Question: $3^2 + 2^2$

Solution: $3^2 = 9$ and $2^2 = 4$.

$9 + 4 = 13$.

Worked Solution: Retrieve and Connect 8, Question 10

Question: Use the diagram to explain why your answers to Q8 and Q9 are different.

Worked Solution: Retrieve and Connect 8, Question 10

Question: Use the diagram to explain why your answers to Q8 and Q9 are different.

Solution: $(3 + 2)^2$ is the area of the whole square of side 5, which is 25. $3^2 + 2^2$ adds only the two small squares (9 and 4), but leaves out the two 3×2 rectangles (each 6). So $3^2 + 2^2 = 13 \neq 25$.

Worked Solution: Retrieve and Connect 8, Question 11

Question: $\frac{4^2 + 2^3}{-9}$, as a recurring decimal

Worked Solution: Retrieve and Connect 8, Question 11

Question: $\frac{4^2 + 2^3}{-9}$, as a recurring decimal

Solution: $4^2 = 16$ and $2^3 = 8$.

$$16 + 8 = 24.$$

$$\frac{24}{-9} = -\frac{8}{3} = -2.666\dots = -2.\dot{6}.$$

Worked Solution: Retrieve and Connect 8, Question 12

Question: $\sqrt{36 + 64}$

Worked Solution: Retrieve and Connect 8, Question 12

Question: $\sqrt{36 + 64}$

Solution: First add inside the square root: $36 + 64 = 100$.
 $\sqrt{100} = 10$.

Worked Solution: Retrieve and Connect 8, Question 13

Question: $\sqrt{36} + \sqrt{64}$

Worked Solution: Retrieve and Connect 8, Question 13

Question: $\sqrt{36} + \sqrt{64}$

Solution: $\sqrt{36} = 6$ and $\sqrt{64} = 8$.

$6 + 8 = 14$.

Worked Solution: Retrieve and Connect 8, Question 14

Question: (Challenge) Use 2, 3 and 4 once each, with any operations, powers or brackets, to make -10 .

Worked Solution: Retrieve and Connect 8, Question 14

Question: (Challenge) Use 2, 3 and 4 once each, with any operations, powers or brackets, to make -10 .

Solution: One way is $2 - 3 \times 4 = 2 - 12 = -10$.

Worked Solution: Retrieve and Connect 8, Question 15

Question: (Challenge) Use 2, 3 and 4 once each, with any operations, powers or brackets, to make 36.

Worked Solution: Retrieve and Connect 8, Question 15

Question: (Challenge) Use 2, 3 and 4 once each, with any operations, powers or brackets, to make 36.

Solution: One way is $3^2 \times 4 = 9 \times 4 = 36$.