

Let's Do

MATHEMATICS

Worktext **6A**

for learners 11 - 12 years old





Let's Practice

Learners demonstrate their understanding of concepts through a range of exercises and problems to be completed in a classroom environment. Questions provide a varying degree of guidance and scaffolding as learners progress to mastery of the concepts.

At Home

Further practice designed to be completed without the guidance of a teacher. Exercises and problems in this section follow on from those completed under Let's Practice.

Hands On

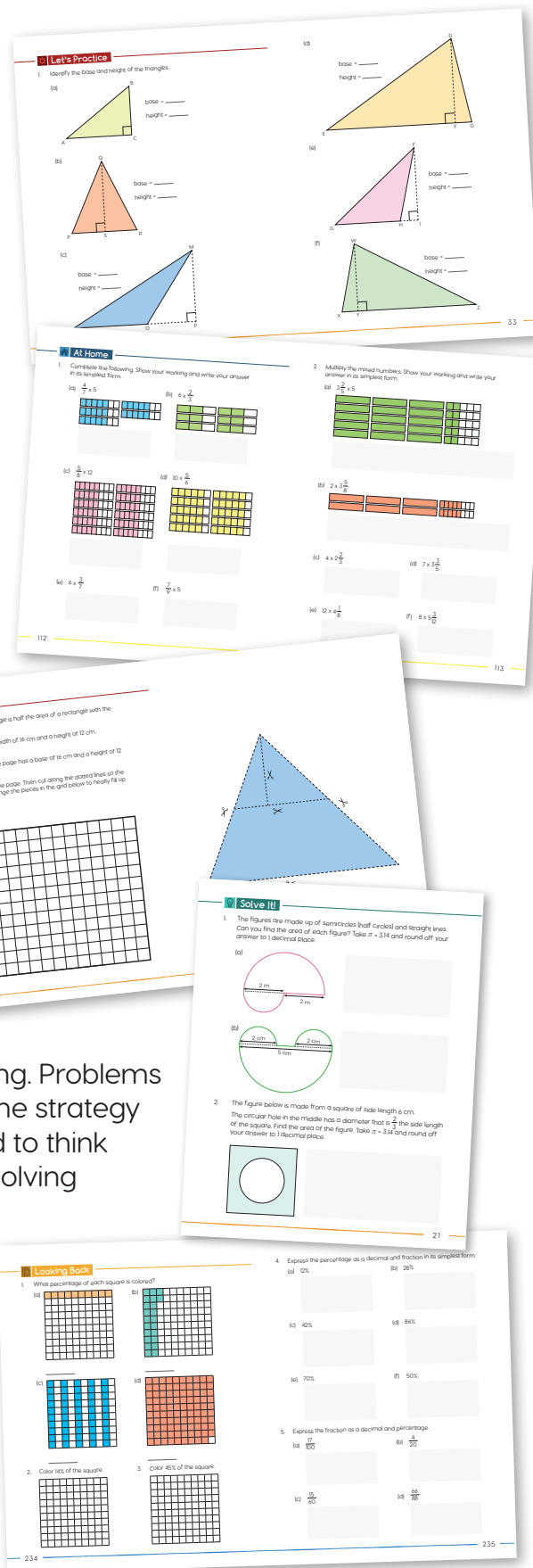
Learners are encouraged to 'learn by doing' through the use of group activities and the use of mathematical manipulatives.

Solve It!

Activities that require learners to apply logical reasoning and problem-solving. Problems are often posed which do not have a routine strategy for solving them. Learners are encouraged to think creatively and apply a range of problem-solving heuristics.

Looking Back

Consolidated practice where learners demonstrate their understanding on a range of concepts taught within a unit.



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1

Integers



Anchor Task



Understanding Integers



Let's Learn

Integers are whole numbers. The numbers on this number line are integers.



Are decimals and fractions integers?

The number line continues in both directions from 0. Numbers to the left of 0 are less than 0. Integers that are less than 0 are **negative integers**. Integers that are greater than 0 are called **positive integers**.

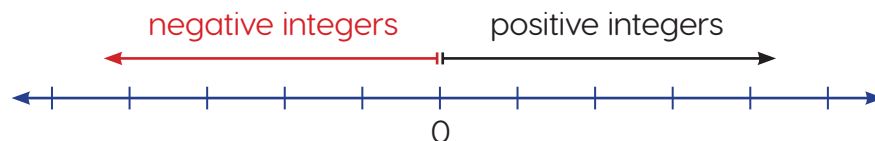


We write: **-5**
We say: **negative five**

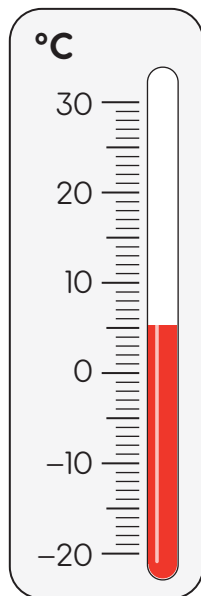


We use a minus sign (-) to show an integer is negative.

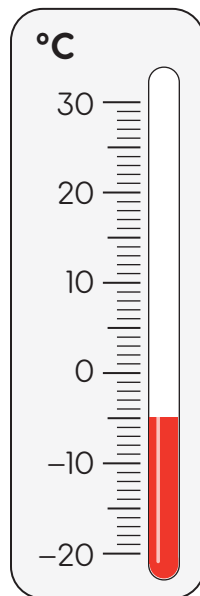
0 is an integer that is neither positive nor negative.



When the temperature falls below 0°C , we read the temperature as a negative number.



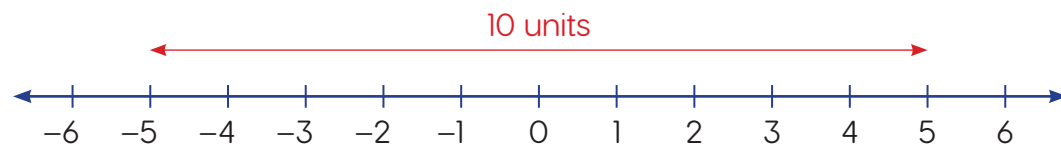
The temperature is 5°C .



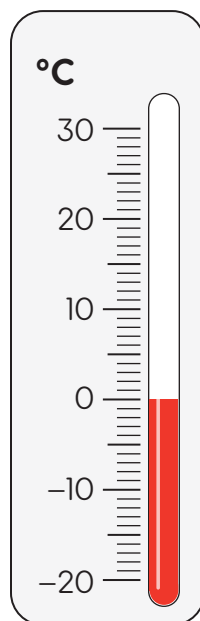
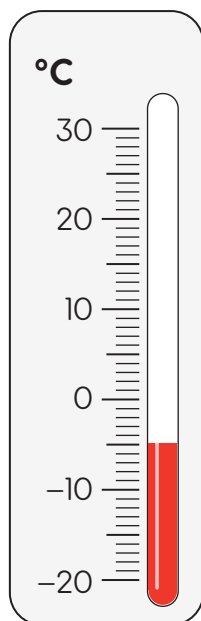
The temperature is -5°C .



The temperature has fallen by 10°C . It is now -5°C .



Compare the thermometers. How has the temperature changed?

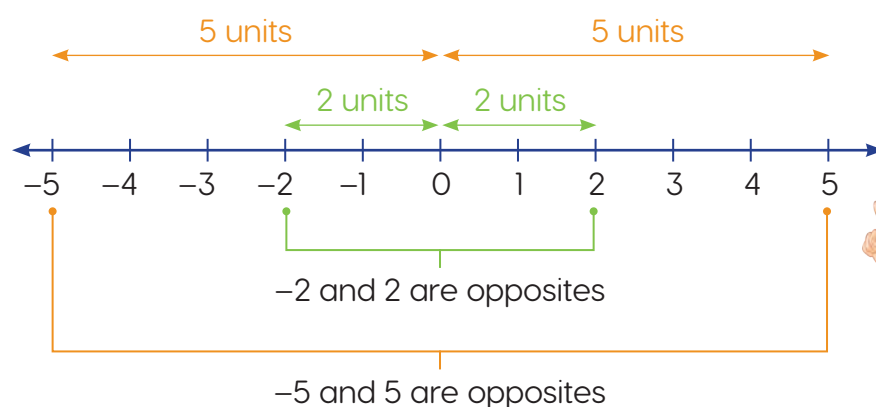


The temperature increased by 5°C . It is now 0°C .



0°C is 5°C warmer than -5°C . -5°C is 5°C cooler than 0°C .

Pairs of integers that are the same distance from 0 are called **opposites**.



0 is its own opposite.

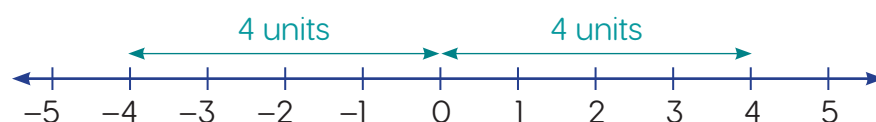
We can find the opposite of an integer by writing a minus sign in front of it.

Integer	Opposite
5	-5
-4	$-(-4) = 4$
12	-12
-1	$-(-1) = 1$
24	-24



The negative of a negative is a positive!

Consider the opposites -4 and 4.



These integers are both an equal distance of 4 units from 0.
An integer's distance from 0 is expressed as its **absolute value**.

Both -4 and 4 have an absolute value of 4.

We write: **$|-4|$**

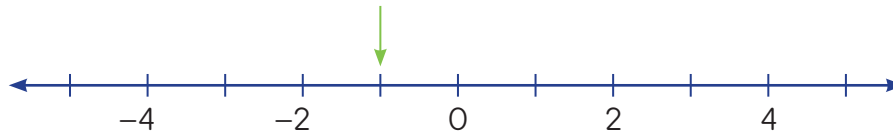
We say: **The absolute value of negative 4.**



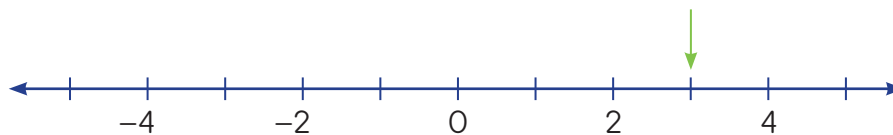
Let's Practice

1. Write the integer indicated on the number line. Find its opposite.

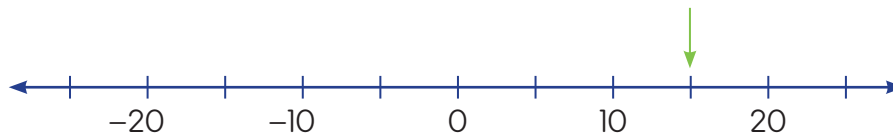
(a) _____ opposite: _____



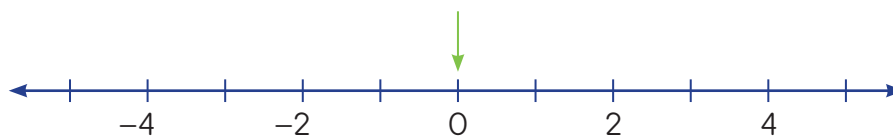
(b) _____ opposite: _____



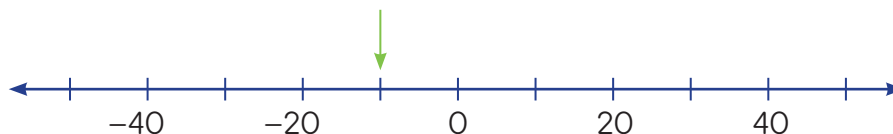
(c) _____ opposite: _____



(d) _____ opposite: _____

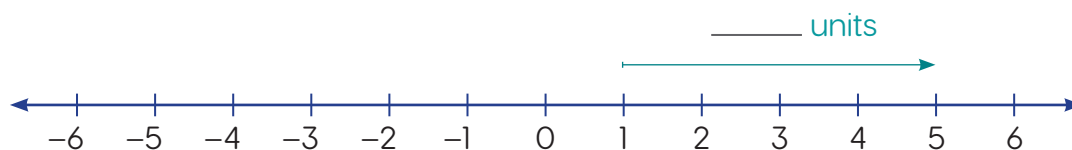


(e) _____ opposite: _____



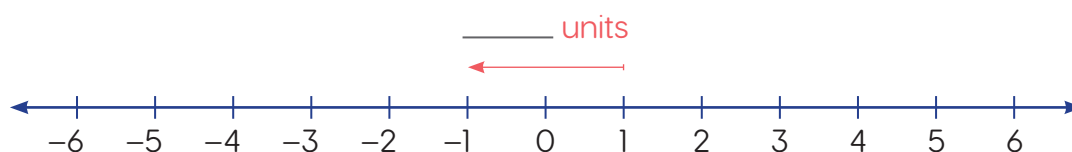
2. Fill in the blanks.

(a)



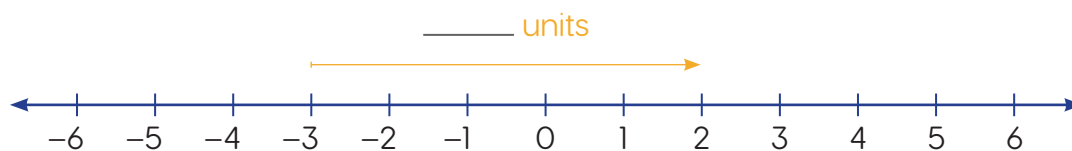
_____ units to the right of 1 is _____.

(b)



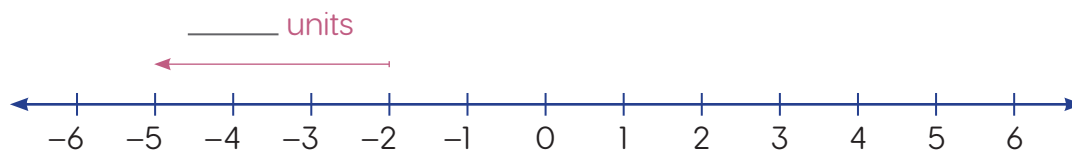
_____ units to the left of 1 is _____.

(c)



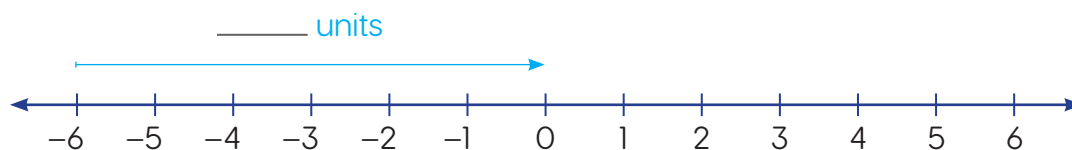
_____ units to the right of _____ is _____.

(d)



_____ units to the left of _____ is _____.

(e)



_____ units to the right of _____ is _____.



3. Find the opposite and absolute value of each integer.

(a) 3

opposite: _____ absolute value: _____

(b) -4

opposite: _____ absolute value: _____

(c) 5

opposite: _____ absolute value: _____

(d) -8

opposite: _____ absolute value: _____

4. Read and answer the questions.

(a) The temperature was 2°C . It increased by 5°C . What is the temperature now? _____

(b) The temperature changed from -6°C to 3°C . How much did the temperature rise? _____

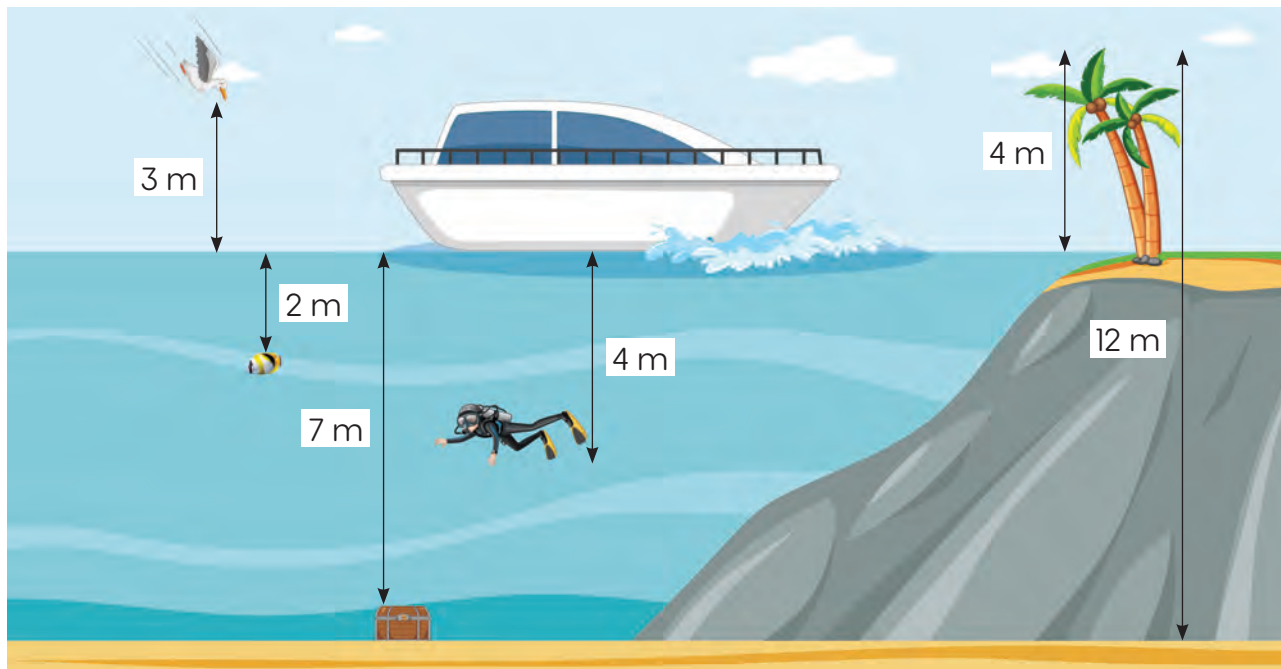
(c) The temperature was 0°C and fell 12°C . What is the temperature now? _____

(d) The temperature is 4°C . How much cooler is -3°C ? _____



Solve It!

Use the diagram to answer the questions.



(a) How deep is the ocean?

(b) How much further does the diver need to dive to reach the treasure chest?

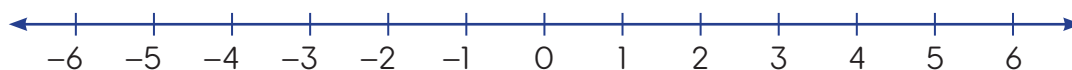
(c) The seagull sees the fish and dives into the ocean to catch it. How far did the fish dive through the air and water?



At Home

1. Read and circle the correct integer on the number line.

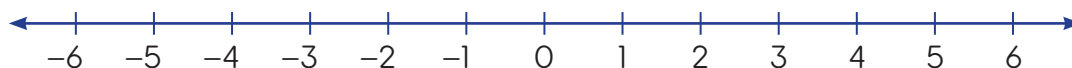
(a) 2 units to the right of 1.



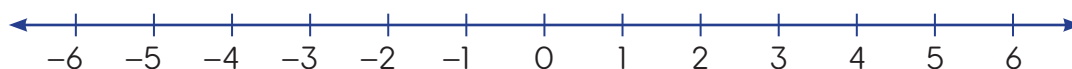
(b) 3 units to the left of 1.



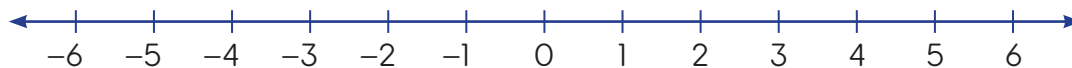
(c) The opposite of 5.



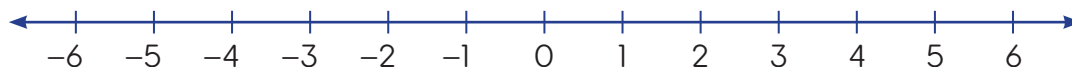
(d) The opposite of -4.



(e) 4 units to the right of -3.



(f) 5 units to the left of 2.





2. Find the opposite and absolute value of each integer.

(a) 2

opposite: _____ absolute value: _____

(b) -3

opposite: _____ absolute value: _____

(c) 0

opposite: _____ absolute value: _____

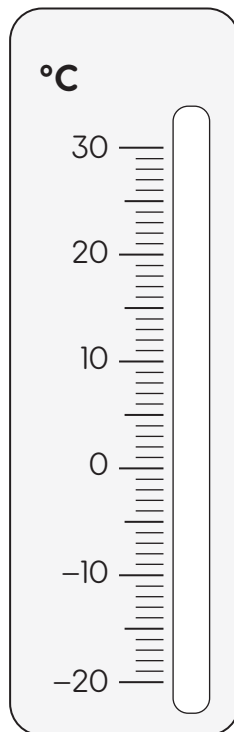
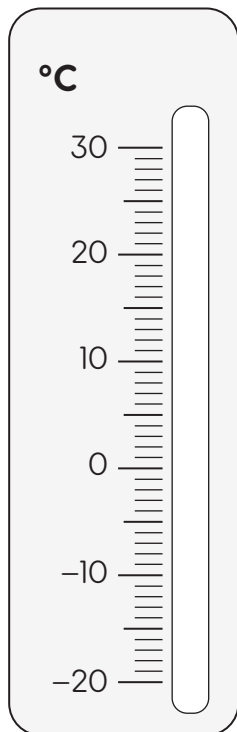
(d) -12

opposite: _____ absolute value: _____

3. Color to show the temperature.

(a) 4°C warmer than 0°C .

(b) 10°C cooler than 8°C .



Comparing and Ordering Integers



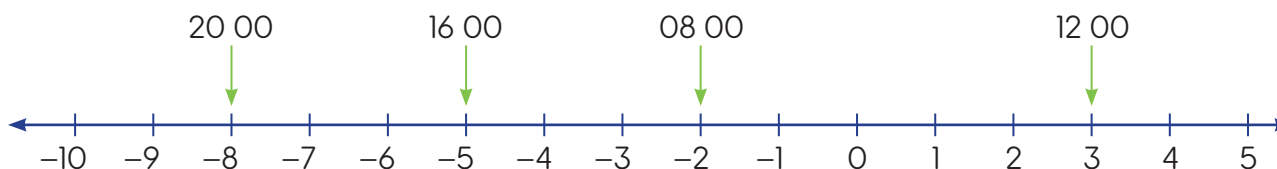
Let's Learn

Chelsea measured the temperature outside 4 times during the day. She recorded her observations in the table.

Time	08 00	12 00	16 00	20 00
Temperature	-2°C	3°C	-5°C	-8°C



To compare the temperatures, we can place them on a number line.



- (a) At what time was the temperature the lowest?

-8 is the furthest number to the left. It is the lowest number.
The temperature was lowest at 20 00.

- (b) At what time was the temperature the highest?

3 is the furthest number to the right. It is the highest number.
The temperature was the highest at 12 00.

- (c) Compare the temperatures at 08 00 and 12 00.

-2 is more left than 3 on the number line. It is the lower number.
We can write: $-2^{\circ}\text{C} < 3^{\circ}\text{C}$ and $3^{\circ}\text{C} > -2^{\circ}\text{C}$

- (d) Arrange the temperatures from the highest to the lowest.

Let's write each temperature as they appear from right to left on the number line.

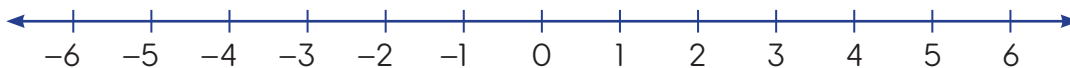
3°C , -2°C , -5°C and -8°C .



Let's Practice

1. Circle the numbers on the number line. Fill in the blanks to compare.

- (a) 3 and 0

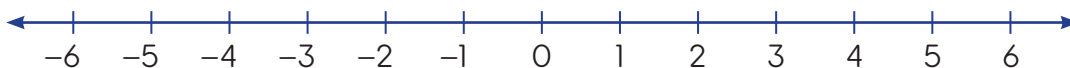


Which number is on the left? _____

Which number is smaller? _____

_____ < _____

- (b) -2 and 1

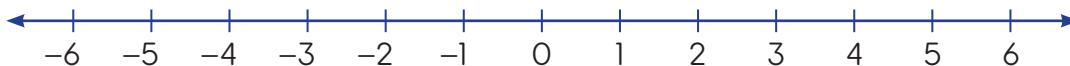


Which number is on the left? _____

Which number is smaller? _____

_____ < _____

- (c) 5 and -3

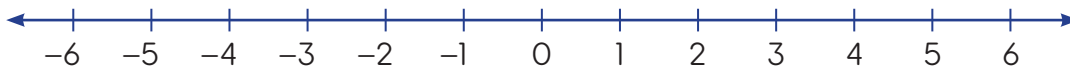


Which number is on the right? _____

Which number is greater? _____

_____ > _____

- (d) $|-2|$ and -6



Which number is on the right? _____

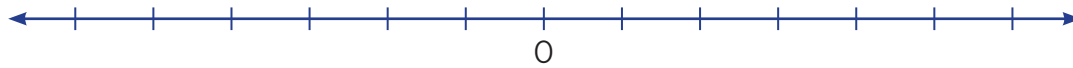
Which number is greater? _____

_____ > _____



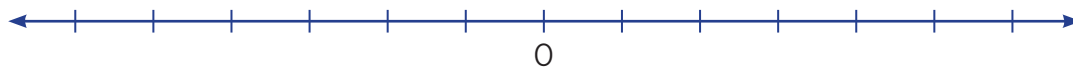
2. Write the numbers on the number line. Then arrange them from the smallest to the greatest.

(a) -1, 5 and 1



_____ < _____ < _____

(b) $|-3|$, 4 and -4



_____ < _____ < _____

3. Compare the numbers by writing $>$, $<$ or $=$ symbols.

(a) -4 _____ 0

(b) -3 _____ 3

(c) -6 _____ -8

(d) 1 _____ 8

(e) -4 _____ -2

(f) 5 _____ 5

4. Arrange the numbers from the greatest to the smallest.

(a) 1, 3, 0

(b) 5, $|-2|$, -3

_____ > _____ > _____

_____ > _____ > _____

(c) $|-1|$, -1, 0

(d) 5, -2, -3

_____ > _____ > _____

_____ > _____ > _____

5. Arrange the numbers from the smallest to the greatest.

(a) 0, -5, -10, 1

_____ < _____ < _____ < _____

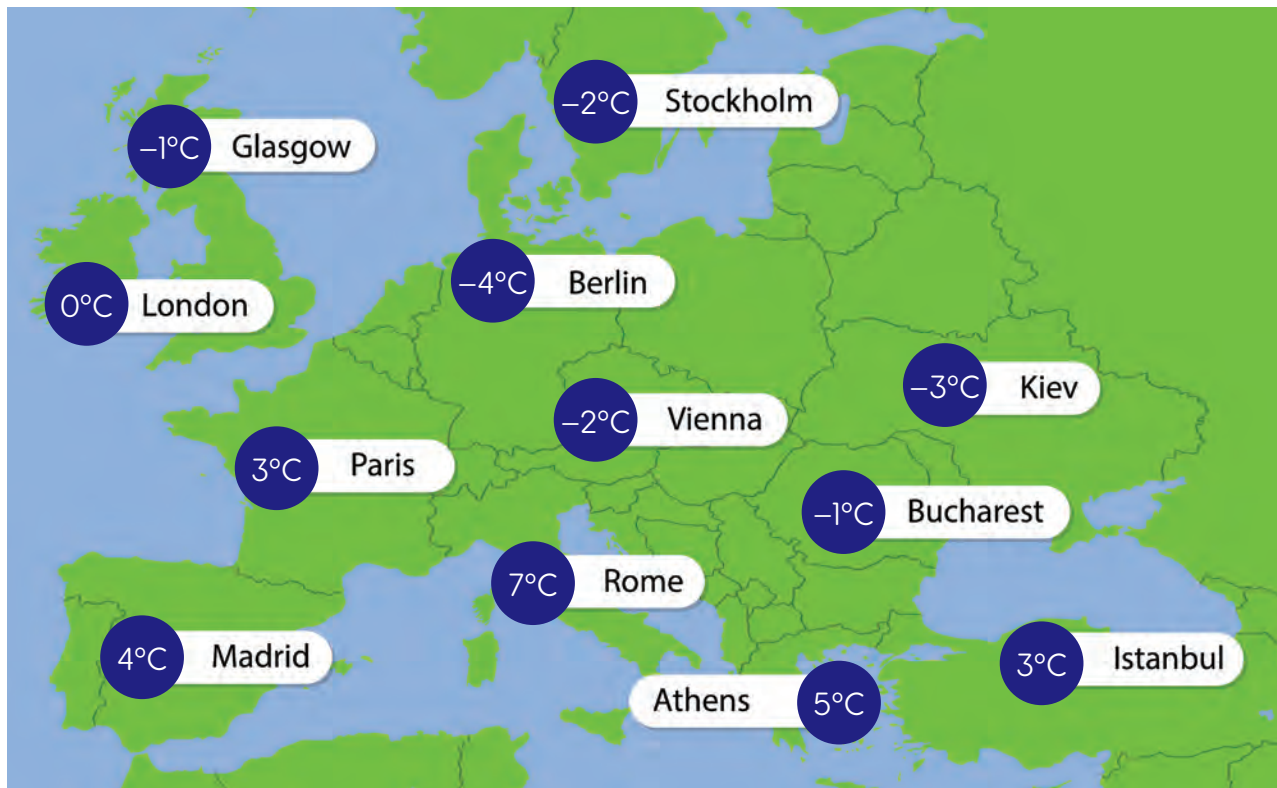
(b) 2, -2, -3, $|-15|$

_____ < _____ < _____ < _____



Solve It!

The map below shows the temperatures across Europe on a winter's day.



(a) Which city has the lowest temperature? _____

(b) Which city has the highest temperature? _____

(c) Name a pair of cities that recorded the same temperature.

_____ and _____

(d) Name a pair of cities that recorded opposite temperatures.

_____ and _____

(e) Which cities recorded the 4 lowest temperatures?

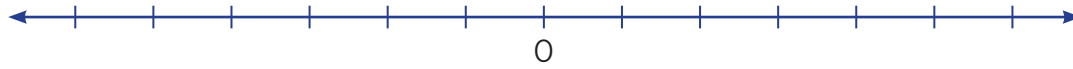
_____, _____, _____ and _____



At Home

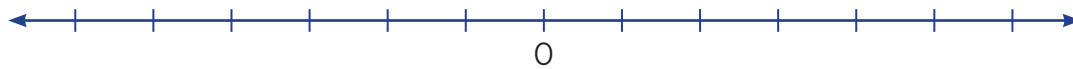
1. Write the numbers on the number line.
Then arrange them from the greatest to the smallest

(a) -3 , -4 and 0



_____ > _____ > _____

(b) 2 , 5 and -5



_____ > _____ > _____

2. Circle the numbers smaller than -3 .
Cross the numbers that are greater than 3 .

0

-4

-12

1

-1

4

2

6

5

-9

-3

-5

3. Arrange the numbers from the greatest to the smallest.

(a) -4 , -1 , -10 , 0

_____ > _____ > _____ > _____

(b) 5 , -12 , 9 , -2

_____ > _____ > _____ > _____

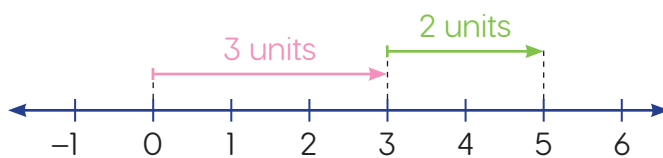
Operations on Integers



Let's Learn

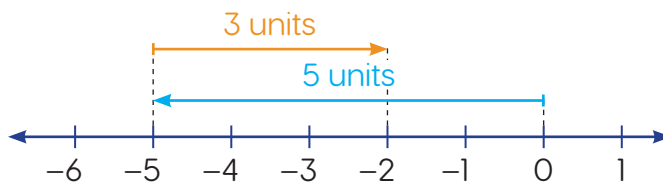
We can use a number line to show addition and subtraction of integers.

The number line below shows $3 + 2 = 5$.

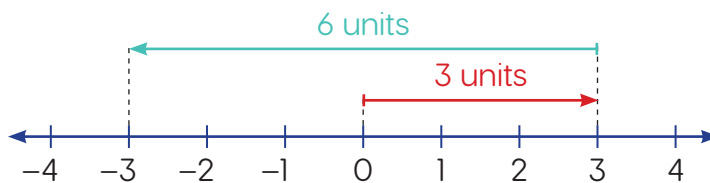


When adding,
we move right along
the number line.

The number line below shows $-5 + 3 = -2$.



The number line below shows $3 + (-6) = -3$.

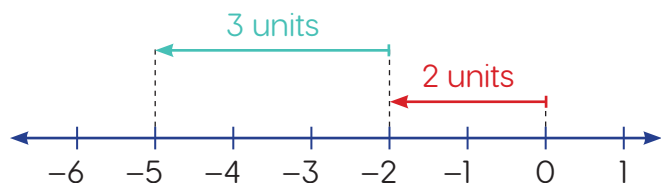


-6 units to
the left of the
number line.

$$3 + (-6) = 3 - 6 = -3$$

**Adding a negative integer is the same
as subtracting a positive integer.**

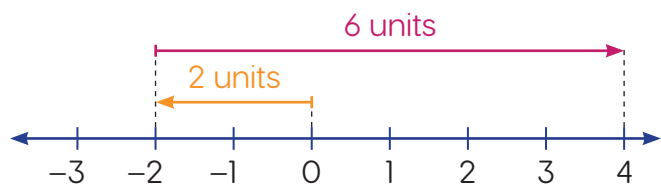
The number line below shows $-2 - 3 = -5$.



$$-2 - 3 = -2 + (-3) = -5$$

Subtracting an integer is the same as adding its opposite.

The number line below shows $-2 - (-6) = 4$.



We add the opposite of -6 , which is 6.

Subtracting -6 is the same as adding its opposite, 6.

$$-2 - (-6) = -2 + 6 = 4$$

The product of integers of the same sign is positive.

You are familiar with the product of positive integers.
Let's look at some examples.

$$3 \times 4 = 12$$

$$5 \times 2 = 10$$

$$16 \times 3 = 48$$

The product of negative integers is also positive.
Let's look at some examples.

$$-3 \times (-4) = 12$$

$$-6 \times (-5) = 30$$

$$-20 \times (-8) = 160$$



The product of integers of different signs is negative.

Let's look at the products of integers with different signs.

$$-3 \times 6 = -18$$

$$7 \times (-3) = -21$$

$$-9 \times 4 = -36$$

The quotient of integers of the same sign is positive.

You are familiar with the quotient of positive integers.

Let's look at some examples.

$$16 \div 2 = 8$$

$$18 \div 6 = 3$$

$$20 \div 4 = 5$$

The quotient of negative integers is also positive.

Let's look at some examples.

$$-16 \div (-2) = 8$$

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

$$-28 \div (-7) = 4$$

The quotient of integers of different signs is negative.

Let's look at the quotients of integers with different signs.

$$-10 \div 5 = -2$$

$$12 \div (-3) = -4$$

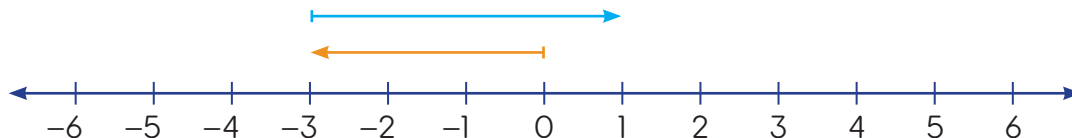
$$-9 \div 3 = -3$$



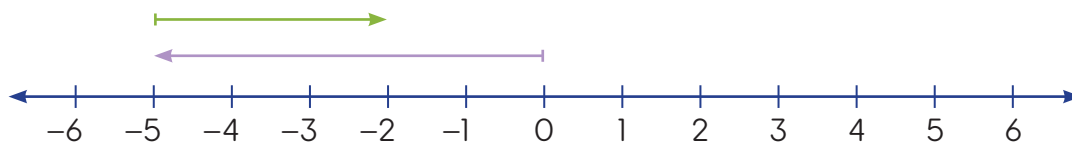
Let's Practice

1. Write an addition equation to match the number line.

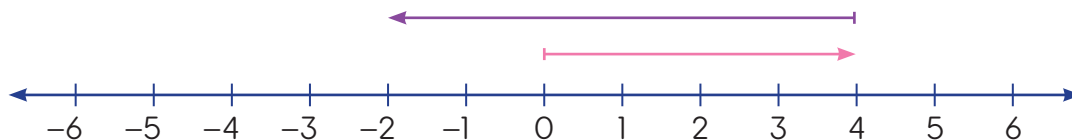
(a) _____



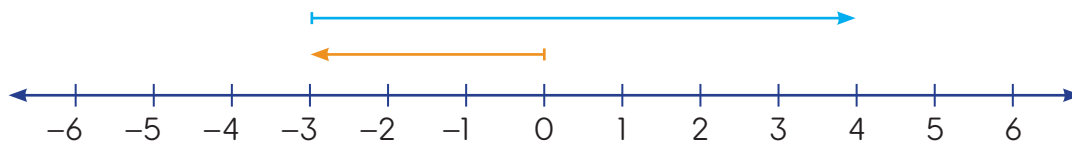
(b) _____



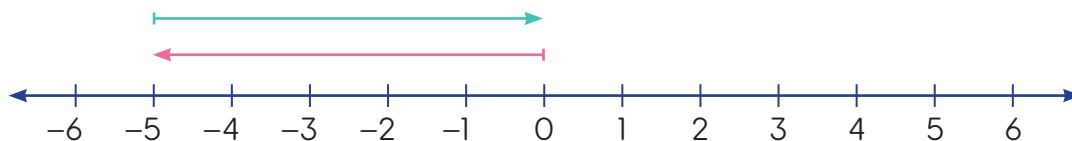
(c) _____



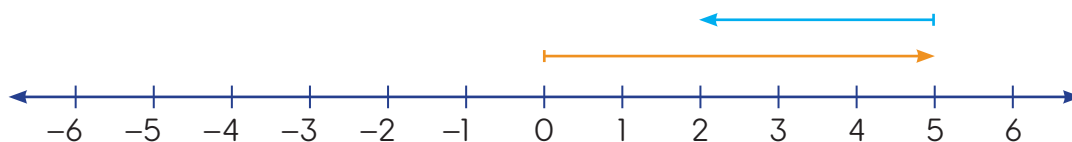
(d) _____



(e) _____



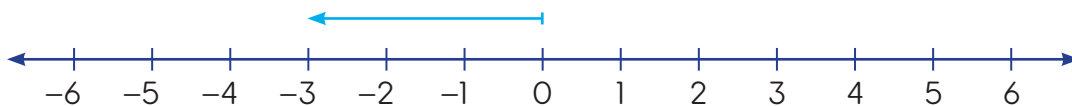
(f) _____



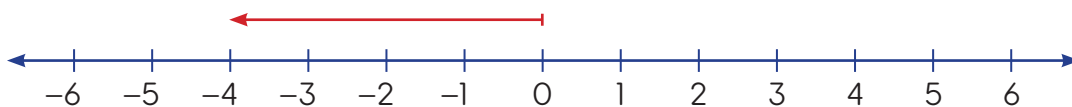


2. Draw an arrow on the number line to represent the addition of integers. Complete the addition equation.

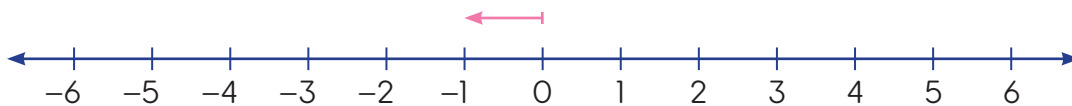
(a) $-3 + 2 = \underline{\hspace{2cm}}$



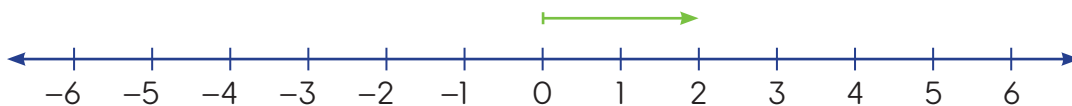
(b) $-4 + 6 = \underline{\hspace{2cm}}$



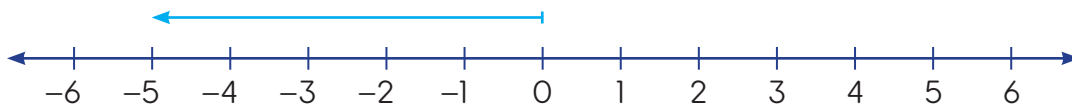
(c) $-1 + 5 = \underline{\hspace{2cm}}$



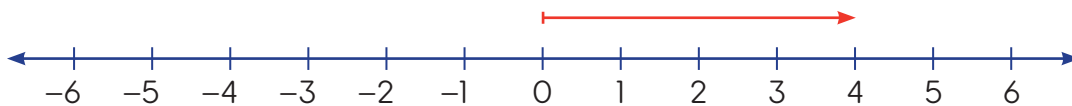
(d) $2 + (-4) = \underline{\hspace{2cm}}$



(e) $-5 + 3 = \underline{\hspace{2cm}}$



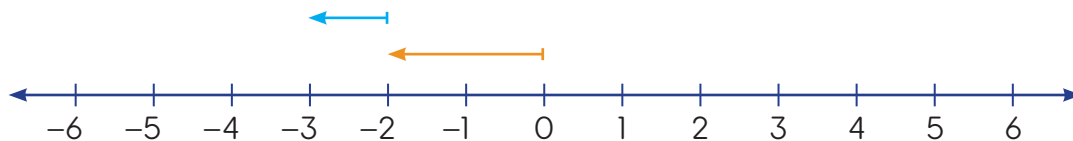
(f) $4 + (-7) = \underline{\hspace{2cm}}$



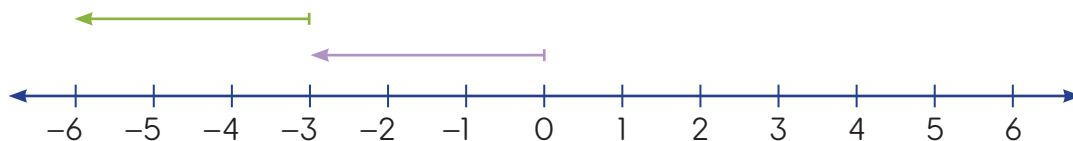


3. Write a subtraction equation to match the number line.

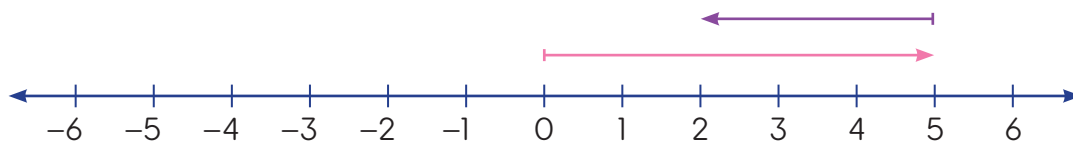
(a) _____



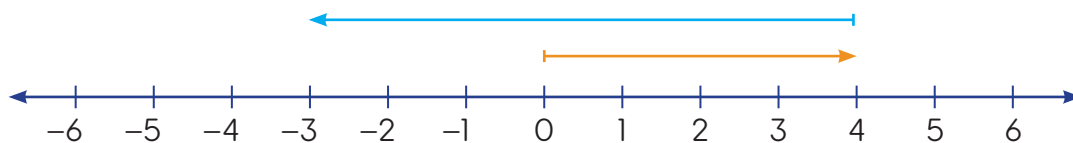
(b) _____



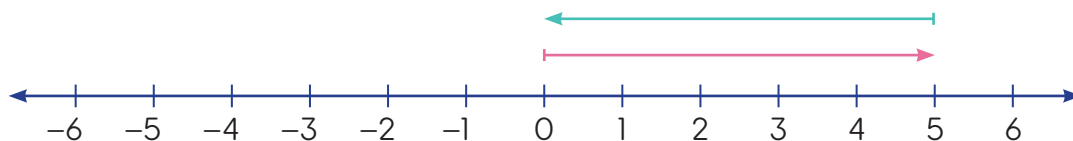
(c) _____



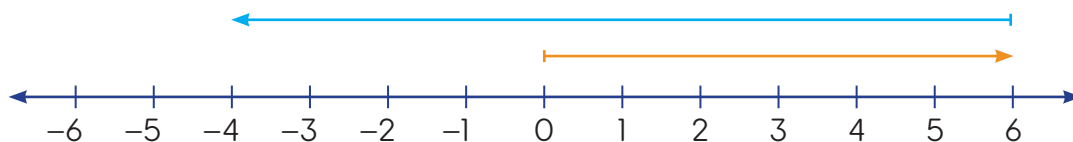
(d) _____



(e) _____



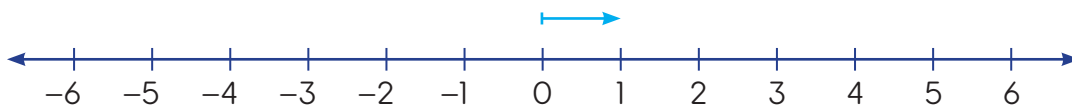
(f) _____



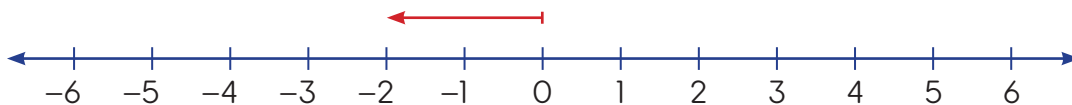


4. Draw an arrow on the number line to represent the subtraction of integers. Complete the subtraction equation.

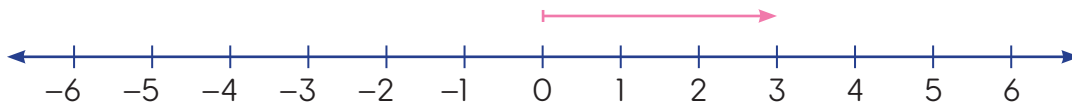
(a) $1 - 5 = \underline{\hspace{2cm}}$



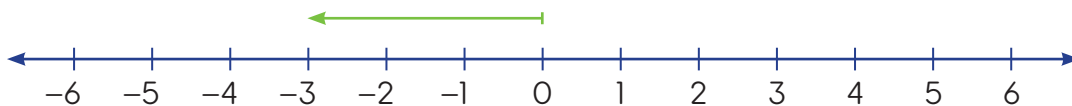
(b) $-2 - 3 = \underline{\hspace{2cm}}$



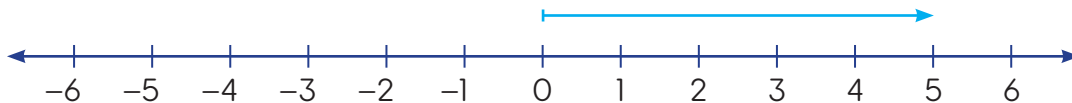
(c) $3 - 6 = \underline{\hspace{2cm}}$



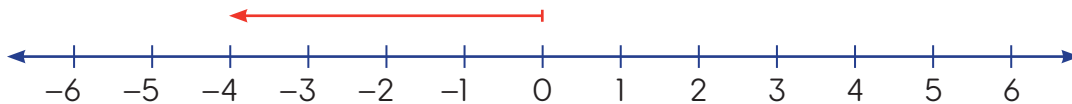
(d) $-3 - (-4) = \underline{\hspace{2cm}}$



(e) $5 - 6 = \underline{\hspace{2cm}}$



(f) $-4 - (-7) = \underline{\hspace{2cm}}$





5. Add or subtract the integers.

- | | | |
|--|---|--|
| (a) $-3 + 10 = \underline{\hspace{2cm}}$ | (b) $8 - 9 = \underline{\hspace{2cm}}$ | (c) $2 - 5 = \underline{\hspace{2cm}}$ |
| (d) $4 + (-8) = \underline{\hspace{2cm}}$ | (e) $-15 + 8 = \underline{\hspace{2cm}}$ | (f) $-9 - (-6) = \underline{\hspace{2cm}}$ |
| (g) $20 - 22 = \underline{\hspace{2cm}}$ | (h) $16 - 20 = \underline{\hspace{2cm}}$ | (i) $-11 + 11 = \underline{\hspace{2cm}}$ |
| (j) $-4 + 19 = \underline{\hspace{2cm}}$ | (k) $6 - (-6) = \underline{\hspace{2cm}}$ | (l) $7 + (-6) = \underline{\hspace{2cm}}$ |
| (m) $0 - 10 = \underline{\hspace{2cm}}$ | (n) $-3 - 0 = \underline{\hspace{2cm}}$ | (o) $16 - (-5) = \underline{\hspace{2cm}}$ |
| (p) $1 + (-11) = \underline{\hspace{2cm}}$ | (q) $-50 + 49 = \underline{\hspace{2cm}}$ | (r) $-2 + (-2) = \underline{\hspace{2cm}}$ |

6. Find the products.

- | | | |
|---|--|--|
| (a) $5 \times 4 = \underline{\hspace{2cm}}$ | (b) $-2 \times 3 = \underline{\hspace{2cm}}$ | (c) $7 \times 5 = \underline{\hspace{2cm}}$ |
| (d) $-2 \times 5 = \underline{\hspace{2cm}}$ | (e) $-7 \times (-5) = \underline{\hspace{2cm}}$ | (f) $3 \times (-3) = \underline{\hspace{2cm}}$ |
| (g) $4 \times 6 = \underline{\hspace{2cm}}$ | (h) $-1 \times (-2) = \underline{\hspace{2cm}}$ | (i) $-4 \times (-8) = \underline{\hspace{2cm}}$ |
| (j) $-10 \times 2 = \underline{\hspace{2cm}}$ | (k) $-12 \times (-5) = \underline{\hspace{2cm}}$ | (l) $6 \times (-9) = \underline{\hspace{2cm}}$ |
| (m) $3 \times (-16) = \underline{\hspace{2cm}}$ | (n) $-8 \times (-8) = \underline{\hspace{2cm}}$ | (o) $100 \times (-2) = \underline{\hspace{2cm}}$ |
| (p) $7 \times (-7) = \underline{\hspace{2cm}}$ | (q) $3 \times (-25) = \underline{\hspace{2cm}}$ | (r) $-9 \times (-9) = \underline{\hspace{2cm}}$ |

7. Find the quotients.

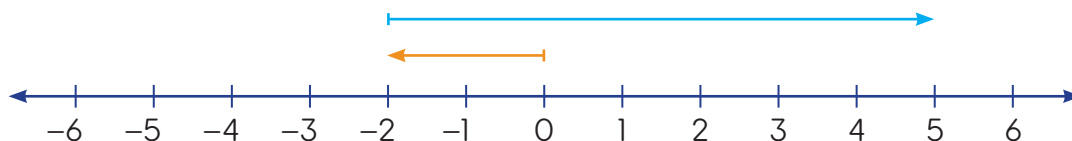
- | | | |
|--|--|---|
| (a) $14 \div (-2) = \underline{\hspace{2cm}}$ | (b) $-18 \div (-6) = \underline{\hspace{2cm}}$ | (c) $-20 \div 5 = \underline{\hspace{2cm}}$ |
| (d) $-4 \div (-2) = \underline{\hspace{2cm}}$ | (e) $42 \div (-7) = \underline{\hspace{2cm}}$ | (f) $-30 \div 15 = \underline{\hspace{2cm}}$ |
| (g) $16 \div (-4) = \underline{\hspace{2cm}}$ | (h) $-81 \div (-9) = \underline{\hspace{2cm}}$ | (i) $-28 \div 4 = \underline{\hspace{2cm}}$ |
| (j) $-6 \div (-2) = \underline{\hspace{2cm}}$ | (k) $24 \div (-6) = \underline{\hspace{2cm}}$ | (l) $-40 \div 20 = \underline{\hspace{2cm}}$ |
| (m) $15 \div (-5) = \underline{\hspace{2cm}}$ | (n) $-72 \div 9 = \underline{\hspace{2cm}}$ | (o) $-100 \div 10 = \underline{\hspace{2cm}}$ |
| (p) $-45 \div (-9) = \underline{\hspace{2cm}}$ | (q) $48 \div (-8) = \underline{\hspace{2cm}}$ | (r) $-56 \div 7 = \underline{\hspace{2cm}}$ |



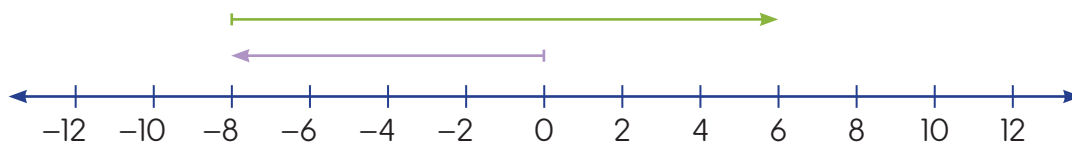
At Home

1. Write an addition equation to match the number line.

(a) _____



(b) _____

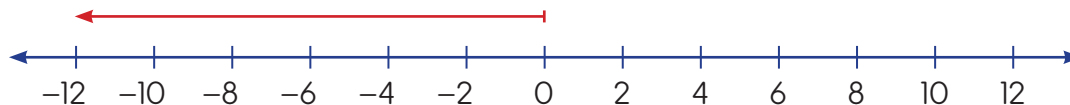


2. Draw an arrow on the number line to represent the addition of integers. Complete the addition equation.

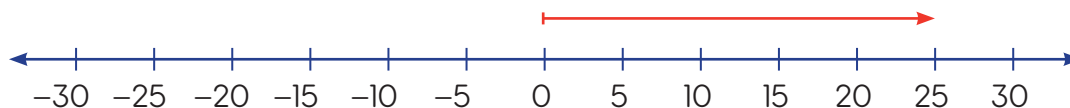
(a) $-2 + 6 =$ _____



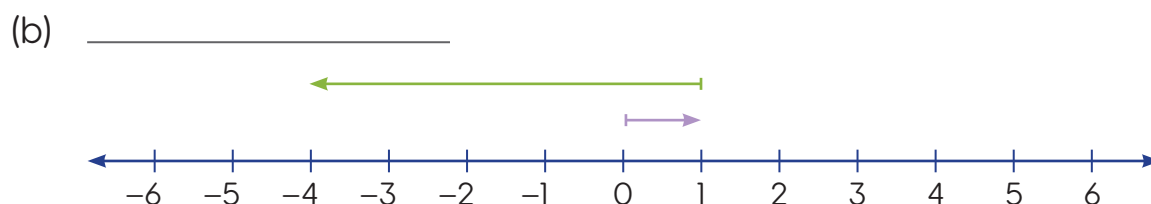
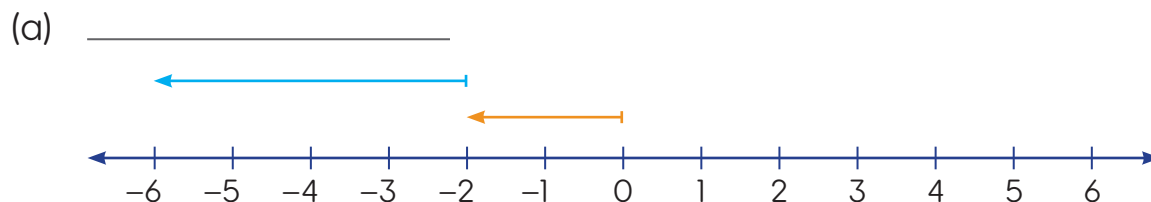
(b) $-12 + 8 =$ _____



(c) $25 + (-35) =$ _____

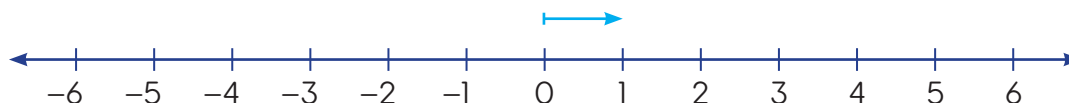


3. Write a subtraction equation to match the number line.

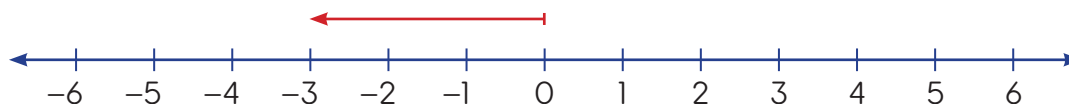


4. Draw an arrow on the number line to represent the subtraction of integers. Complete the subtraction equation.

(a) $1 - 7 = \underline{\hspace{2cm}}$



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



5. Complete the equations.

(a) $4 + (-1) = \underline{\hspace{2cm}}$ (b) $-12 + (-2) = \underline{\hspace{2cm}}$ (c) $6 + (-12) = \underline{\hspace{2cm}}$

(d) $12 \div (-2) = \underline{\hspace{2cm}}$ (e) $-18 \div (-9) = \underline{\hspace{2cm}}$ (f) $-27 \div 3 = \underline{\hspace{2cm}}$

(g) $5 - 10 = \underline{\hspace{2cm}}$ (h) $-2 - (-2) = \underline{\hspace{2cm}}$ (i) $12 - (-5) = \underline{\hspace{2cm}}$

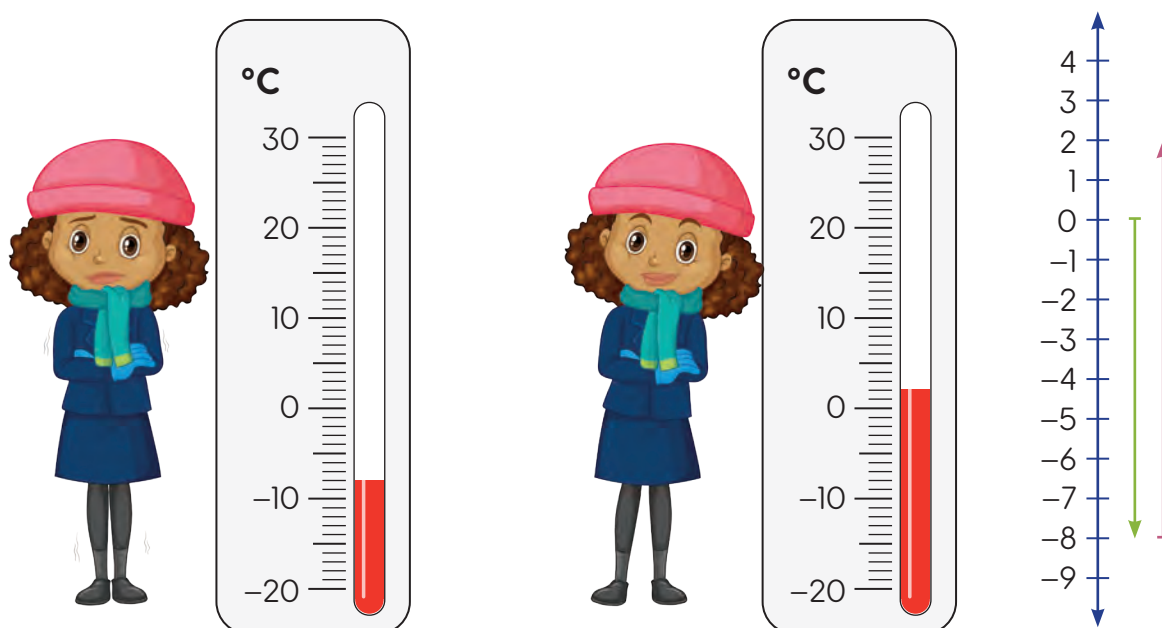
(j) $-19 \times 2 = \underline{\hspace{2cm}}$ (k) $-12 \times (-3) = \underline{\hspace{2cm}}$ (l) $5 \times (-6) = \underline{\hspace{2cm}}$

Word Problems



Let's Learn

When Keira woke up in the morning, the temperature outside was -8°C . By the time she arrived at school, the temperature was 2°C . Find the increase in temperature.

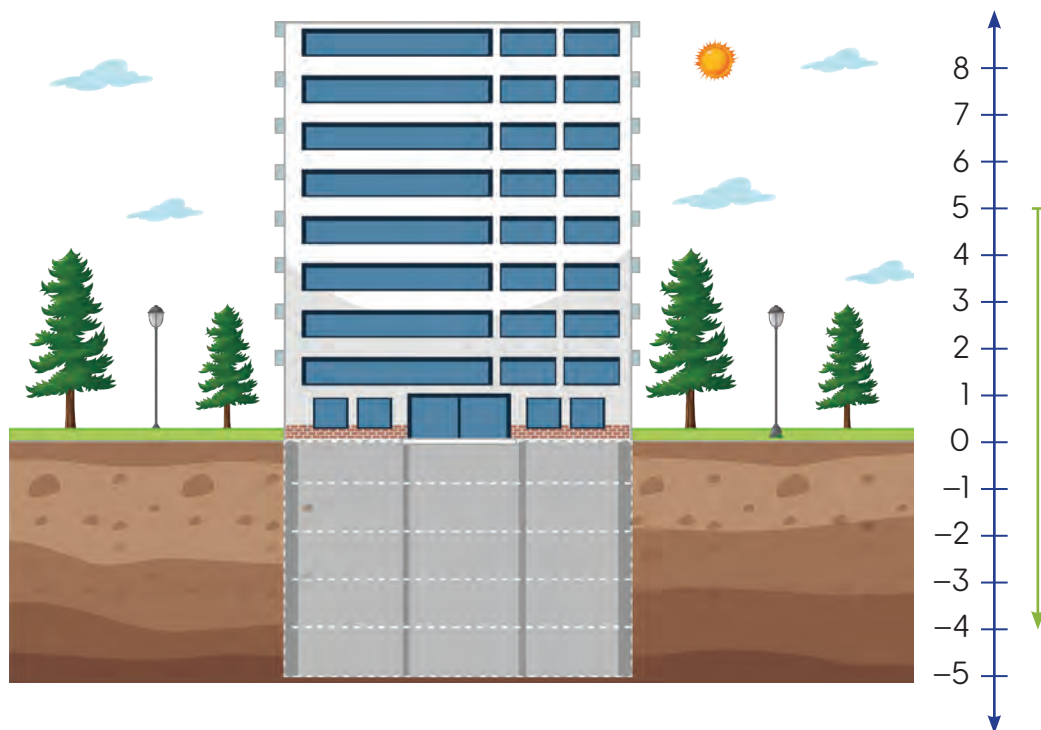


To find the increase in temperature, we need to find the difference. Let's subtract the lower integer from the higher integer.

$$2 - (-8) = 10$$

The temperature increased by 10°C .

An office building has 8 levels above ground and 5 basement levels. Mr. Sato took the elevator from his office on the 5th floor to the 4th basement level. How many levels down did Mr. Sato move?

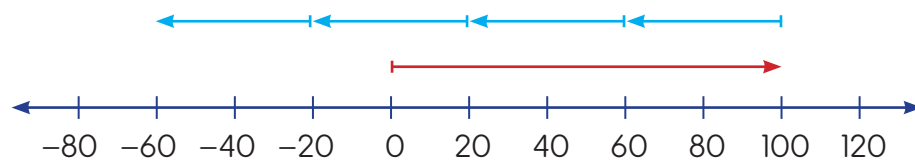


Let's find the difference.

$$5 - (-4) = 9$$

Mr. Sato moved down 9 levels.

Mrs. Yi has \$100 in her savings account. Her car repayments are deducted from her savings account at a rate of \$40 per week. Find Mrs. Yi's account balance after 4 weeks of car repayments.



$$\begin{aligned} 100 - (4 \times 40) &= 100 - 160 \\ &= -60 \end{aligned}$$

Mrs. Yi's account balance is -\$60. Her account is \$60 in debt.

A car consumes 9 liters of fuel per hour. Find the change in fuel after 5 hours.

We can represent the consumption of fuel as a negative number.

$$-9 \times 5 = -45$$

The car will consume 45 liters of fuel in 5 hours.

Look at the weather map and answer the questions below.



(a) How much warmer is Baltimore compared to Charleston?

$$7 - (-3) = 10$$

It is 10°C warmer in Baltimore than Charleston.

(b) Which city is 6°C cooler than New York?

$$0 - 6 = -6$$

Pittsburgh is 6°C cooler than New York.

(c) What is the temperature difference between the coolest and warmest cities?

$$7 - (-19) = 26$$

The temperature difference between the coolest and warmest cities is 26°C.



Let's Practice

1. Sophie is cooking in the kitchen. She takes some chicken nuggets from the freezer and puts them into the oven. The freezer is set to -16°C and the oven is set to 180°C . Find the difference in temperature.

2. Mr. Finch is exercising and dieting to lose weight. He loses 2 kg every month. Express Mr. Finch's change in weight after 8 months.

3. Ethan's basement is 4 meters below ground level. His tree house is 3 meters above the ground. Find the difference in height of Ethan's basement and tree house.