Dividing Integers

To calculate the mean temperature over a day, meteorologists measure the temperature at regular intervals. Explain how they calculate the mean after the data have been collected.

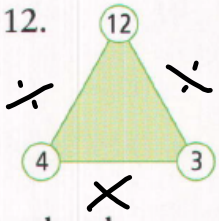
Time	midnight	2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.
Temperature (°C)	−15	−14	−14	−12	−8	−7	−5	−5	−6	−8	−11	−14

$$\text{Mean} = \frac{\text{Total temp}}{\#\text{ of data}}$$

$$= \frac{-119}{12} = -9.9\,^{\circ}\text{C}$$

How can you divide integers?

The triangle illustrates the multiplication statement $4 \times 3 = 12$. It also illustrates the related division statements $12 \div 4 = 3$ and $12 \div 3 = 4$.



Part 1: Divide Opposite Integers

1. Copy the triangle. Add symbols and arrows to show the related multiplication and division statements.

$12 \div 4 = 3$

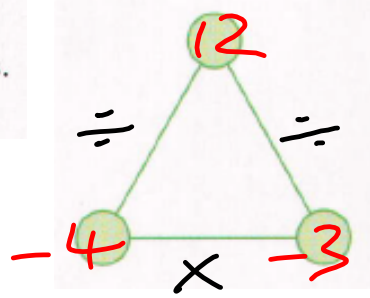
$12 \div 3 = 4$

$3 \times 4 = 12$

2. **a)** Draw a similar triangle to illustrate $-4 \times (-3) = 12$.
b) Use the triangle to write the related division statements.
c) What sign does each of your answers have?

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

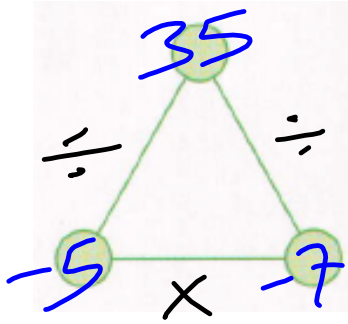
c) Negative



3. **a)** Draw a triangle to illustrate $-5 \times (-7) = 35$.
b) Use the triangle to write the related division statements.
c) What sign does each of your answers have?

b) $35 \div -5 = -7$
$35 \div -7 = -5$

c) Negative

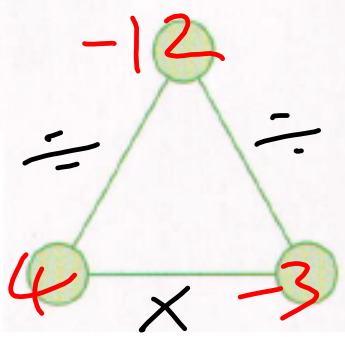


Part 2: Divide Negative Integers by Positive and Negative Integers

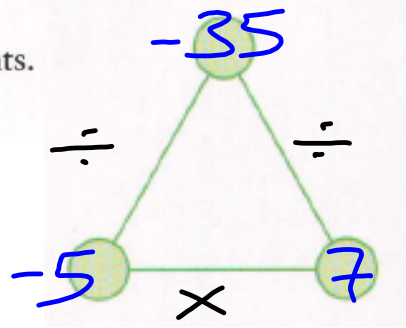
1. **a)** Draw a triangle to illustrate $4 \times (-3) = -12$.
b) Use the triangle to write the related division statements.
c) What sign does each of your answers have?

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

c) Negative
Positive



2. a) Draw a triangle to illustrate $-5 \times 7 = -35$.
b) Use the triangle to write the related division statements.
c) What sign does each of your answers have?



b) $-35 \div -5 = 7$
$-35 \div 7 = -5$

c) Positive
Negative

Example 1: Divide Integers

Jodi has to decrease the temperature of a chemical solution by 20°C. She can only decrease it 4°C at a time so crystals will not form.
a) How many times must she decrease the temperature?
b) What integer division rule does this show?

a) $-20 \div 4 = -5$
$\Rightarrow$ 5 decreases of 4°C

b) Neg ÷ Pos = Negative

Example 2: Find the Mean Point Loss

Tim lost a total of 150 points in five questions on a TV game show.

a) What was his mean point loss per question?

b) What integer division rule does this show?

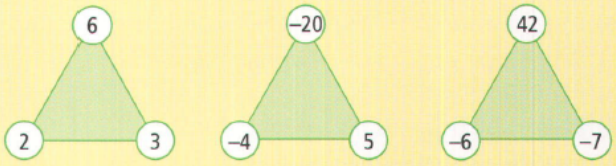
a) $-150 \div 5 = -30$

$\Rightarrow$ loss of 30 points per question

b) Neg ÷ Pos = Negative

Key Ideas

- You can use triangles to illustrate division of integers.



- When dividing two integers,
  - if the signs are the same, the quotient is positive
  - if the signs are different, the quotient is negative

$6 \div 2 = 3$, $6 \div 3 = 2$, and $-20 \div (-4) = 5$

$-20 \div 5 = -4$, $42 \div (-6) = -7$, and $42 \div (-7) = -6$

To multiply and divide integers, follow the same sign rules. But watch out for adding and subtracting! These are different.

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