ALGEBRA
Lesson 2   Negative Numbers

1. WORKING WITH NEGATIVE NUMBERS ON THE CALCULATOR

Negative numbers are numbers that are less than zero. They are written with a minus sign in front of them, for example, –5 or –40.
On the HiSET Math Test, you are allowed to use the calculator, so be sure you understand how to add, subtract, multiply, and divide negative numbers on the calculator.

To enter a negative number on the calculator, enter the number first, then press the +/– key. This key is on the far left, third row down.
Do not use the subtraction key to enter a negative number. The subtraction key will work in some kinds of calculations, but not in all, so it is best to use the +/– key all the time.

To enter –6   Press 6, then press the +/– key
To enter –15   Press 15, then press the +/– key

Examples of Calculations, with Calculator Keystrokes

Problem	Calculator Keystrokes	Answer
–5 + 10	5 +/– + 10 =	5
–6 + (–12)	6 +/– + 12 +/– =	–18
–6 – 12	6 +/– – 12 =	–18
–4 – (–18)	4 +/– – 18 +/– =	14
–9 x (–8)	9 +/– x 8 +/– =	72
5 x (–4)	5 x 4 +/– =	–20
16 ÷ (–2)	16 ÷ 2 +/– =	–8
–40 ÷ (–5)	40 +/– ÷ 5 +/– =	8

Notice that parentheses are placed around some of the negative numbers. This is done to separate the negative sign from the operation sign that comes before it.

For example, in the problem –6 + (–12) the –12 is placed inside parentheses to separate the negative sign from the addition sign. It is considered incorrect form to write –6 + –12 without the parentheses around the negative number.

If the negative number is at the beginning of the expression, you can use parentheses around the negative number, but it is not required. –9 + 17 and (–9) + 17 are both correct forms of the expression.

Be aware that adding a negative number is the same as subtraction.
15 + (–20) has the same value as 15 – 20. Both expressions equal –5.
It can be written either way, but is usually shown as 15 – 20.

Practice One   *Answers – p. 5*

Do these problems on you calculator. See *Practice Five* if you want more practice.

1) –6 + 7 =

2) –5 – (–14) =

3) –3 x (–7) =

4) –30 ÷ (–6) =

5) –12 + (–7) =

6) 50 ÷ (–10) =

7) –18 + 3 =

8) 14 – (–6) =

9) –32 ÷ 8 =

10) –15 – (–4) =

11) 7 x (–6) =

12) –9 – 8 =

13) –4 – (–2) =

14) 6 x (–2) =

15) –8 x 3 =

16) –5 + (–13) =

2. WORKING WITH NEGATIVE NUMBERS WITHOUT THE CALCULATOR

For the purpose of taking the HiSET Math Test, you do not need to learn how to work with negative numbers by hand. If you want to learn how to work with negative numbers without using a calculator, continue. If not, you can stop here, though it is a good idea to do the remaining practice sets using your calculator.

Addition Rules:

1. If both numbers have the same sign, add them and the answer has that sign.
Add two positive numbers, the answer is positive.   7 + 8 = 15
Add two negative numbers, the answer is negative.   –7 + (–8) = –15

2. If the numbers have different signs, find the difference between them (subtract), and give the answer the sign of the larger number.
Negative number is bigger, answer is negative.   –15 + 10 = –5
Positive number is bigger, answer is positive.   15 + (–10) = 5

Practice Two   Do by hand, check with calculator. *Answers – p. 5*

1) 5 + (–4) =

2) –7 + (–9) =

3) –12 + 8 =

4) 9 + 15 =

5) –9 + (–10) =

6) 2 + (–14) =

7) –16 + 9 =

8) 14 + (–12) =

Subtraction Rules:

First: Turn the subtraction problem into an addition problem.

      Step 1. Change the subtraction sign to an addition sign.

      Step 2. Change the sign of the number that follows the subtraction sign.

Then: Follow the addition rules for negative numbers.

<u>Example 1</u>   *<u>Type One Problem: Minus a negative becomes plus a positive.</u>*

  $9 - (-6)$

  <u>First:</u> Step 1 (red): Change subtraction sign to addition sign.

      Step 2 (green): Change negative 6 to positive 6.

      $9 - (-6)$ → $9 + (+6)$

  <u>Then:</u> $9 + (+6) = 15$

<u>Example 2</u>   *<u>Type Two Problem: Minus a positive becomes plus a negative.</u>*

  $-8 - 3$

  <u>First:</u> $-8 - 3$ is the same as $-8 - (+3)$

      Step 1 (red): Change subtraction sign to addition sign.

      Step 2 (green): Change positive 3 to negative 3.

      $-8 - (+3)$ → $-8 + (-3)$

  <u>Then:</u> $-8 + (-3) = -11$

NOTE – When we say $-8 - 3$ is the same as $-8 - (+3)$ in Example 2 above, all that happens is the positive sign is written in front of the positive number 3. Positive signs are not normally written, but we show them here just to illustrate the changes.

<u>Examples</u>

  $7 - (-4)$ → $7 + (+4) = 11$

  $-12 - 6$ is the same as $-12 - (+6)$ → $-12 + (-6) = -18$

  $-10 - (-3)$ → $-10 + (+3) = -7$

  $-5 - (-9)$ → $-5 + (+9) = 4$

  $8 - 14$ is the same as $8 - (+14)$ → $8 + (-14) = -6$

Practice Three Do by hand, check with calculator. *Answers – p. 5*

1) $12 - (-5) =$ **5)** $-12 - 4 =$

2) $-6 - 18 =$ **6)** $-9 - (-7) =$

3) $-14 - (-3) =$ **7)** $20 - (-1) =$

4) $3 - 12 =$ **8)** $15 - 25 =$

Multiplication and Division Rules:

1. Disregard any negative signs and do the multiplication or division.

2. Then, look at the signs of the two numbers. If both are the same, the sign of the answer is positive.
   Both numbers positive, the answer is positive. $7 \times 5 = 35$ $36 \div 12 = 3$
   Both numbers negative, the answer is positive. $-7 \times (-5) = 35$ $-36 \div (-12) = 3$

3. If the signs of the two numbers are different, one positive and one negative, the sign of the answer is negative. $-6 \times 5 = -30$ $8 \times (-6) = -48$
   $-48 \div 12 = -4$ $27 \div (-9) = -3$

Practice Four Do by hand, check with calculator. *Answers – p. 5*

1) $-9 \times (-2) =$

2) $4 \times (-5) =$

3) $16 \div 4 =$

4) $-80 \div (-10) =$

5) $6 \times 8 =$

6) $-11 \times 6 =$

7) $-15 \div 5 =$

8) $60 \div (-3) =$

NOTE – Think of the rules for negative numbers as two separate sets of rules, one set of rules for addition/subtraction and another set of rules for multiplication/division. People often confuse the rules for addition/subtraction with the rules for multiplication/division.

Remember, the "two negatives gives you a positive answer" rule is only for multiplication/division. It does not work with addition/subtraction problems.

Remember, the "give your answer the sign of the bigger number" rule is only for addition problems that have one positive and one negative number. It does not work with multiplication/division or subtraction problems.

Practice Five **Mixed Practice** Do by hand, check with calculator. *Answers – p. 6*

1) $-5 + (-8) =$

2) $-7 - 6 =$

3) $-5 \times (-4) =$

4) $-10 + 18 =$

5) $45 \div (-9) =$

6) $17 + 2 =$

7) $-12 - (-15) =$

8) $-3 \times 6 =$

9) $9 + (-8) =$

10) $22 - 5 =$

11) $7 \times (-4) =$

12) $40 \div 8 =$

13) $-18 + 7 =$

14) $30 - (-10) =$

15) $8 \times 2 =$

16) $-81 \div (-9) =$

<u>ANSWER KEY</u> Lesson 2 Negative Numbers

Practice One

1) $-6 + 7 = \mathbf{1}$

2) $-5 - (-14) = \mathbf{9}$

3) $-3 \times (-7) = \mathbf{21}$

4) $-30 \div (-6) = \mathbf{5}$

5) $-12 + (-7) = \mathbf{-19}$

6) $50 \div (-10) = \mathbf{-5}$

7) $-18 + 3 = \mathbf{-15}$

8) $14 - (-6) = \mathbf{20}$

9) $-32 \div 8 = \mathbf{-4}$

10) $-15 - (-4) = \mathbf{-11}$

11) $7 \times (-6) = \mathbf{-42}$

12) $-9 - 8 = \mathbf{-17}$

13) $-4 - (-2) = \mathbf{-2}$

14) $6 \times (-2) = \mathbf{-12}$

15) $-8 \times 3 = \mathbf{-24}$

16) $-5 + (-13) = \mathbf{-18}$

Practice Two

1) $5 + (-4) = \mathbf{1}$

2) $-7 + (-9) = \mathbf{-16}$

3) $-12 + 8 = \mathbf{-4}$

4) $9 + 15 = \mathbf{24}$

5) $-9 + (-10) = \mathbf{-19}$

6) $2 + (-14) = \mathbf{-12}$

7) $-16 + 9 = \mathbf{-7}$

8) $14 + (-12) = \mathbf{2}$

Practice Three

1) $12 - (-5) = 12 + (+5) = \mathbf{17}$

2) $-6 - 18 = -6 + (-18) = \mathbf{-24}$

3) $-14 - (-3) = -14 + (+3) = \mathbf{-11}$

4) $3 - 12 = 3 + (-12) = \mathbf{-9}$

5) $-12 - 4 = -12 + (-4) = \mathbf{-16}$

6) $-9 - (-7) = -9 + (+7) = \mathbf{-2}$

7) $20 - (-1) = 20 + (+1) = \mathbf{21}$

8) $15 - 25 = 15 + (-25) = \mathbf{-10}$

Practice Four

1) $-9 \times (-2) = \mathbf{18}$

2) $4 \times (-5) = \mathbf{-20}$

3) $16 \div 4 = \mathbf{4}$

4) $-80 \div (-10) = \mathbf{8}$

5) $6 \times 8 = \mathbf{48}$

6) $-11 \times 6 = \mathbf{-66}$

7) $-15 \div 5 = \mathbf{-3}$

8) $60 \div (-3) = \mathbf{-20}$

1) $-5 + (-8) = \mathbf{-13}$

2) $-7 - 6 = -7 + (-6) = \mathbf{-13}$

3) $-5 \times (-4) = \mathbf{20}$

4) $-10 + 18 = \mathbf{8}$

5) $45 \div (-9) = \mathbf{-5}$

6) $17 + 2 = \mathbf{19}$

7) $-12 - (-15) = -12 + (+15) = \mathbf{3}$

8) $-3 \times 6 = \mathbf{-18}$

9) $9 + (-8) = \mathbf{1}$

10) $22 - 5 = \mathbf{17}$

11) $7 \times (-4) = \mathbf{-28}$

12) $40 \div 8 = \mathbf{5}$

13) $-18 + 7 = \mathbf{-11}$

14) $30 - (-10) = 30 + (+10) = \mathbf{40}$

15) $8 \times 2 = \mathbf{16}$

16) $-81 \div (-9) = \mathbf{9}$