DIAGNOSTIC: INTEGERS

Integers are all the whole numbers (0, 1, 2, 3, 4…) plus the negative values.
Therefore, integers are {…-3, -2, -1, 0, 1, 2, 3, …}

Integer Diagnostic – Record your answers in the matching box below without a calculator:

1) $8 + 3$

2) $9 + (–6)$

3) $10 – 4$

4) $12 – (–5)$

5) 6×9

6) $8 \div (–4)$

7) $–5 + (–4)$

8) $–5 + 11$

9) $7 – 12$

10) $–7 – 2$

11) $–7 \times 8$

12) $24 \div 3$

13) $13 + 8$

14) $12 + (-15)$

15) $–2 – (–6)$

16) $8 – (–11)$

17) $–2 \times (–4)$

18) $–20 \div 4$

19) $–4 + (–9)$

20) $–7 + 3$

21) $–8 – (–5)$

22) $–4 – 6$

23) $–6 \times 7$

24) $18 \div 3$

25) $–6 + (–2)$

26) $8 + (–3)$

27) $–9 – (–2)$

28) $7 – (–2)$

29) $–2 \times (–7)$

30) $8 \div (–2)$

31) $14 + 9$

32) $–5 + 112$

33) $11 – 18$

34) $–11 – 6$

35) 12×5

36) $–45 \div 9$

37) $19 + 8$

38) $7 + (–13)$

39) $17 – 4$

40) $–3 – 10$

41) $–11 \times 7$

42) $–54 \div (–6)$

43) $–5 + (–3)$

44) $–17 + 9$

45) $–7 – (–15)$

46) $5 – (–7)$

47) $(6)(–9)$

48) $\dfrac{-56}{-7}$

1) 11	2) 3	3) 6	4) 17	5) 54	6) -2
7) -9	8) 6	9) -5	10) -9	11) -56	12) 8
13) 21	14) -3	15) 4	16) 19	17) 8	18) -5
19) -13	20) -4	21) -3	22) -10	23) -42	24) 6
25) -8	26) 5	27) -7	28) 9	29) 14	30) -4
31) 23	32) 107	33) -7	34) -17	35) 60	36) -5
37) 27	38) -6	39) 13	40) -13	41) -77	42) 9
43) -8	44) -8	45) 8	46) 12	47) -54	48) 8

Diagnostic Results:
Each column represents a particular type of question. Which column did you have the most difficulty with?
1 – Adding numbers with the same sign
2 – Adding numbers with opposite signs
3 – Subtracting numbers with the same sign
4 – Subtracting numbers with opposite signs
5 – Multiplying
6 – Dividing

ADDITION

CASE 1: SAME SIGN (+) + (+) or (-) + (-)

> **RULE**
> **SIGN: KEEP the common sign**
> **VALUE: ADD the numbers**

Example 1: *(+2) + (+1)*	**Example 2**: *(–2) + (–4)*
SIGN → Both are (+) so the answer will be (+)	SIGN → Both are (-) so the answer will be (-)
QUANTITY → 2 + 1 = 3	QUANTITY → 2 + 4 = 6
ANSWER: Therefore the answer is __+3__	ANSWER: Therefore the answer is __– 6__

Let's Try Some:
a. (+3) + (+7)= +10   b. (–9) + (–3)= –12   c. (+3) + (+2) = +5   d. (–8) + (–5)= –13

CASE 2: OPPOSITE SIGN   (+) + (-) OR (-) + (+)

> **RULE**
> **SIGN: Keep the sign of the larger number (ignoring the sign)**
> **VALUE :Then find the difference between the two numbers (without the signs)**

Example 3: *(-8) + (+1)*	Example 4: *(-2) + (+4)*
SIGN → Which number is larger, 8 or 1? 8 is (–) therefore the answer will be (–)	**SIGN** → Which number is larger, 4 or 2? 4 is (+) therefore the answer will be (+)
QUANTITY → 8 is larger than 1 by how much? (or 8-1) = 7	**QUANTITY** → 4 is larger than 2 by how much? (or 4-2) = 2
ANSWER: Therefore the answer is __–7__	**ANSWER**: Therefore the answer is __+2__

Let's Try Some: *** go left to right**

a. (–3) + (+7)=   b. (–9) + (+3)=   c. (–3) + (+2) =   d. (+8) + (–5) + (-3) + (+4)=

S : +ve   S : –ve   S : – $= (+3) + (-3) + (+4)$

Q = 7-3   Q : 9-3   Q = 3-2 $= 0 + (+4)$

= 4   = 6   = 1   = 4

A = +4   A = –6   A = –1

SUBTRACTION - Adding the opposite!

Subtracting can get tricky! To avoid this, we are able to change the question from subtract to add, if you change <u>whatever follows the subtract sign</u> to '*the opposite'.* This is referred to as *'adding the opposite or the additive inverse'.* Once it is +, we follow the rules from the previous page.

Ex 1: *(+8) − (+1)* *opposite*

Add the opposite: (+8) + (−1)

SIGN → Which number is larger, 8 or 1? 8 is (+) therefore the answer will be (+)

QUANTITY→ 8 is larger than 1 by how much? 7

ANSWER: Therefore the answer is __+7__

Ex 2: *(−2) − (+4)* *opposite*

Add the opposite: (−2) + (-4)

SIGN → Both numbers are (−), so the answer will be (−)

QUANTITY → 2 + 4 = 6

ANSWER: Therefore the answer is __−6__

Let's Try Some:

a. (−6) − (+4)=
$= (-6) + (-4)$
$= -10$

b. (−9) − (−9)=
$= (-9) + (+9)$
$= 0$

c. (−3) − (+3) =
$= (-3) + (-3)$
$= -6$

d. (+8) − (−5) + (+3) − (−2) =
$= (+8) + (+5) + (+3) + (+2)$
$= 18$

MULTIPLICATION and DIVISION

There is a simple rule used for multiplying and dividing integers:

SAME SIGNS PRODUCE POSITIVE	OPPOSITE SIGNS PRODUCE NEGATIVE
(+) x (+) or (+) ÷ (+) = (**+**) (−) x (−) or (−) ÷ (−) = (**+**)	(+) x (−) or (+) ÷ (−) = (**−**) (−) x (+) or (−) ÷ (+) = (**−**)

Ex 1: *(+8) x (-4)*

SIGN → (+) x (-) = (**−**)

QUANTITY → 8 x 4 = 32

ANSWER: Therefore the answer is __−32__

Ex 2: $\dfrac{(-6)}{(-2)}$

SIGN → (−) ÷ (−) = (**+**)

QUANTITY → 6 ÷ 2 = 3

ANSWER: Therefore the answer is __+3__

Let's Try Some:

a. (−6) x (+4)= **−24**
S : −
a : 24
A = −24

e. $\dfrac{-21}{-7} =$ **+3**
S : +
Q : 3
A = +3

b. (−9)(−9)(+4)= **324**
S : (−)(−)(+)
: (+)(+)
: (+)
Q = (81)(4)
= 324

c. (−1) ÷ (+4)= **$\frac{-1}{4}$**
S = −
Q = ¼
A = −¼

d. (−9) ÷ (−9)= **+1**
S : +
Q : 1
A = +1

* Exponent is repeated multiplication
$2^4 = 2 \times 2 \times 2 \times 2 = 16$ $-2^4 = - 2 \times 2 \times 2 \times 2 = -16$ $(-2)^4 = -2 \times -2 \times -2 \times -2 = 16$

f. $(-1)^3 =$ $(-1)(-1)(-1)$
$= (+1)(-1)$
$= -1$

g. $(-5)^2 (4)$
$= (-5)(-5)(4)$
$= 25(4)$
$= 100$

h. $-5^2 (4)$
$= -5(5)(4)$
$= -25(4)$
$= -100$

1. **Adding Integers:**

   a. $(+4) + (+2) =$ __+6__

   b. $(+3) + (+5) =$ __+8__

   CASE 1

   c. $(-3) + (-5) =$ __−8__

   d. $(-4) + (-2) =$ __−6__

   CASE 2

   e. $(+5) + (-3) =$ __+2__

   f. $(-7) + (+3) =$ __−4__

   To add two positive integers, we…

   – Sign: apply the common sign which is +ve
   Quantity: collect/add the integers

   To add two negative integers, we…

   Sign: apply the common sign "−"ve
   Quantity: collect/add the integers.

   To add one positive and one negative integer, we…

   Sign: apply the sign of the *larger number
   Quantity: find the difference between the two
   * disregard the sign

2. **Subtracting Integers**

   a. $(-4) - (-3) = (-4) + (+3) =$ __−1__

   b. $(+4) - (+6) = (+4) + (-6) =$ __−2__

   To subtract integers, we…

   Step1: Switch the operation from subtraction to addition
   Step2: Switch the sign of the integer being subtracted
   Step3: Apply the rules for addition

3. **Multiplying or Dividing Integers**

   a. $(+9) \times (+3) =$ __+27__

   b. $(+60) \div (+4) =$ __+15__

   c. $(-4) \times (-7) =$ __+28__

   d. $(-36) \div (-12) =$ __+3__

   e. $(-6) \times (+5) =$ __−30__

   f. $(-40) \div (+4) =$ __−10__

   g. $(+4) \times (-6) =$ __−24__

   h. $(+20) \div (-4) =$ __−5__

   To multiply or divide two positive numbers, we…

   Sign: apply "+ve sign
   Quantity: calculate the quantity

   To multiply or divide two negative numbers, we…

   Sign: apply "+ve sign
   Quantity: Calculate the quantity

   To multiply or divide one positive and one negative number, we…

   Sign: apply "−"ve sign
   Quantity: Calculate the quantity

4. **Exponents and Integers**

   a. $(-2)^2 =$ __$(-2)(-2)$__ $= +4$

   b. $-2^2 =$ __$(2)(2)$__ $= -4$

   To evaluate the power, the exponent is only applied to the base, which is directly to the left of the exponent.

   What is the difference between question a. and b.?

   Paranthesis in a tells us to include the sign in the repeated multiplication

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COMPLETE: Homework Package page 1 and 2 left side only   **Page 4**