

Name _____

Date _____

1.2 Multiplying and dividing integers — worked answers

Multiply and divide with positive and negative integers. · 60 questions

A · Fluency — Sign rules, powers of negatives and chains.

1 $-6 \times 7 =$

Answer: -42

Different signs give a negative answer: $-6 \times 7 = -42$.

2 $9 \times (-4) =$

Answer: -36

Different signs give a negative answer: $9 \times (-4) = -36$.

3 $-8 \times (-5) =$

Answer: 40

Same signs give a positive answer: $-8 \times (-5) = 40$.

4 $-3 \times 12 =$

Answer: -36

Different signs give a negative answer: $-3 \times 12 = -36$.

5 $11 \times (-3) =$

Answer: -33

Different signs give a negative answer: $11 \times (-3) = -33$.

6 $-7 \times (-7) =$

Answer: 49

Same signs give a positive answer: $-7 \times (-7) = 49$.

7 $-1 \times 15 =$

Answer: -15

Different signs give a negative answer: $-1 \times 15 = -15$.

8 $20 \times (-5) =$

Answer: -100

Different signs give a negative answer: $20 \times (-5) = -100$.

9 $-48 \div 6 =$

Answer: -8

Different signs give a negative answer: $-48 \div 6 = -8$.

10 $-72 \div (-9) =$

Answer: 8

Same signs give a positive answer: $-72 \div (-9) = 8$.

11 $56 \div (-7) =$

Answer: -8

Different signs give a negative answer: $56 \div (-7) = -8$.

12 $-100 \div 25 =$

Answer: -4

Different signs give a negative answer: $-100 \div 25 = -4$.

13 $84 \div (-12) =$

Answer: -7

Different signs give a negative answer: $84 \div (-12) = -7$.

14 $-60 \div (-4) =$

Answer: 15

Same signs give a positive answer: $-60 \div (-4) = 15$.

15 $-144 \div 12 =$

Answer: -12

Different signs give a negative answer: $-144 \div 12 = -12$.

16 $150 \div (-30) =$

Answer: -5

Different signs give a negative answer: $150 \div (-30) = -5$.

17 $(-5)^2 =$

Answer: 25

$(-5)^2$ means -5 multiplied by itself 2 times, which is 25. An even number of negative factors gives a positive answer.

18 $(-2)^3 =$

Answer: -8

$(-2)^3$ means -2 multiplied by itself 3 times, which is -8 . An odd number of negative factors gives a negative answer.

19 $(-10)^2 =$

Answer: 100

$(-10)^2$ means -10 multiplied by itself 2 times, which is 100. An even number of negative factors gives a positive answer.

20 $(-3)^3 =$

Answer: -27

$(-3)^3$ means -3 multiplied by itself 3 times, which is -27 . An odd number of negative factors gives a negative answer.

21 $(-1)^3 =$

Answer: -1

$(-1)^3$ means -1 multiplied by itself 3 times, which is -1 . An odd number of negative factors gives a negative answer.

22 $(-4)^2 =$

Answer: 16

$(-4)^2$ means -4 multiplied by itself 2 times, which is 16. An even number of negative factors gives a positive answer.

23 $-3 \times (-4) \times (-2) =$

Answer: -24

Work left to right: $-3 \times (-4) \times (-2) = -24$. Count the negative factors — an even number gives a positive answer.

24 $-60 \div (-4) \div 5 =$

Answer: 3

Work left to right: $-60 \div (-4) \div 5 = 3$. Count the negative factors — an even number gives a positive answer.

25 $-4 \times 6 \div (-3) =$

Answer: 8

Work left to right: $-4 \times 6 \div (-3) = 8$. Count the negative factors — an even number gives a positive answer.

26 $2 \times (-5) \times (-6) =$

Answer: 60

Work left to right: $2 \times (-5) \times (-6) = 60$. Count the negative factors — an even number gives a positive answer.

27 $-96 \div 8 \div (-2) =$

Answer: 6

Work left to right: $-96 \div 8 \div (-2) = 6$. Count the negative factors — an even number gives a positive answer.

28 $-2 \times (-2) \times (-2) \times (-2) =$

Answer: 16

Work left to right: $-2 \times (-2) \times (-2) \times (-2) = 16$. Count the negative factors — an even number gives a positive answer.

B · Reasoning — Missing integers and order of operations.

29 Fill in the missing integer: $\underline{\hspace{1cm}} \times 5 = -15$

Answer: -3

$-15 \div 5 = -3$, so the missing integer is -3 .

30 Fill in the missing integer: $\underline{\hspace{1cm}} \div 4 = -8$

Answer: -32

$-8 \times 4 = -32$.

31 Fill in the missing integer: $-7 \times \underline{\hspace{1cm}} = 63$

Answer: -9

$63 \div (-7) = -9$.

32 Fill in the missing integer: $\underline{\hspace{1cm}} \div (-8) = -6$

Answer: 48

$-6 \times (-8) = 48$.

33 Fill in the missing integer: $-54 \div \underline{\hspace{1cm}} = 6$

Answer: -9

$-54 \div 6 = -9$, so the missing integer is -9 .

- 34** Without calculating, is $-2 \times (-3) \times (-4) \times (-5)$ positive or negative?

☐ Positive
☐ Negative

Answer: Positive

There are 4 negative factors. An even number of negatives gives a positive product (the answer is 120).

- 35** Without calculating, is $(-1) \times (-1) \times (-1) \times (-1) \times (-1)$ positive or negative?

☐ Positive
☐ Negative

Answer: Negative

Five negative factors — an odd number — so the product is negative (it is -1).

- 36** Arun says " $(-4)^2 = -16$ ". Is he correct?

☐ Yes
☐ No

Answer: No

$(-4)^2$ means $(-4) \times (-4) = 16$. The brackets mean the minus sign is squared too.

- 37** The product of two integers is -36 . One of them is 9. What is the other?

Answer: -4

$-36 \div 9 = -4$.

- 38** $a \times b = -56$ and $a = -8$. Work out b .

Answer: 7

$b = -56 \div (-8) = 7$.

- 39** Work out $-3 \times 4 + -5 \times 2$.

Answer: -22

Multiply before adding: $-12 + (-10) = -22$.

- 40** Work out $20 \div (-4) - 3 \times (-6)$.

Answer: 13

Divide and multiply first: $-5 - (-18) = -5 + 18 = 13$.

C · Challenge — Products, sums and extremes.

- 41** The product of two integers is -24 and their sum is 5. What is the larger integer?

Answer: 8

Try factor pairs of -24 : 8 and -3 give a product of -24 and a sum of 5. The larger is 8.

- 42** The product of two integers is -24 and their sum is 5. What is the smaller integer?

Answer: -3

The pair is 8 and -3 , so the smaller is -3 .

- 43** What is the largest product you can make by multiplying two different numbers chosen from $-9, -4, 2, 6$?

Answer: 36

Two negatives give a positive: $-9 \times (-4) = 36$, which beats $2 \times 6 = 12$.

- 44** What is the smallest product you can make by multiplying two different numbers chosen from $-9, -4, 2, 6$?

Answer: -54

Make it as negative as possible: $-9 \times 6 = -54$.

- 45 Work out $(-2)^3 \times (-3)^2$.

Answer: -72

$(-2)^3 = -8$ and $(-3)^2 = 9$, so $-8 \times 9 = -72$.

- 46 Work out $(-6)^2 \div (-3) \times 2$.

Answer: -24

$36 \div (-3) = -12$, then $-12 \times 2 = -24$.

- 47 How many different pairs of integers multiply to give -12 ? (Count -1×12 and 12×-1 as the same pair.)

Answer: 6

The pairs are $(-1, 12)$, $(1, -12)$, $(-2, 6)$, $(2, -6)$, $(-3, 4)$ and $(3, -4)$ — 6 pairs.

- 48 n is a negative integer. What is the value of $n^2 \div n$ when $n = -7$?

Answer: -7

$(-7)^2 = 49$, and $49 \div (-7) = -7$. In fact $n^2 \div n$ is always n .

D · Word problems — Repeated change in real contexts.

- 49 A diver descends 8 m every minute. How far below the surface is she after 6 minutes? Give your answer as a negative number of metres.

Answer: -48

$-8 \times 6 = -48$ m.

- 50 The temperature drops 3°C every hour for 7 hours. What is the total change in temperature, in $^\circ\text{C}$?

Answer: -21

$-3 \times 7 = -21^\circ\text{C}$.

- 51 A shop loses \$250 each week. Over how many weeks does it lose \$2 000?

Answer: 8

$-2000 \div (-250) = 8$ weeks.

- 52 Five friends share a debt of \$85 equally. How much does each owe, in dollars? Give your answer as a negative number.

Answer: -17

$-85 \div 5 = -17$, so each owes \$17.

- 53 A submarine descends at 12 m per minute from the surface. How long, in minutes, until it reaches -180 m?

Answer: 15

$-180 \div (-12) = 15$ minutes.

- 54 A freezer cools at 4°C per hour. It started at 18°C . What is the temperature after 6 hours, in $^\circ\text{C}$?

Answer: -6

$18 + (-4 \times 6) = 18 - 24 = -6^\circ\text{C}$.

- 55 A game gives -15 points for each wrong answer. Mia scored -90 from wrong answers only. How many did she get wrong?

Answer: 6

$-90 \div (-15) = 6$ wrong answers.

- 56** In a quiz you gain 5 points for a correct answer and lose 3 for a wrong one. Rashid answers 12 questions and gets 7 correct. What is his score?

Answer: 20

$7 \times 5 = 35$ and $5 \text{ wrong} \times (-3) = -15$. $35 + (-15) = 20$.

- 57** A mine shaft goes down 9 m per level for 14 levels. What is the depth of the bottom, in metres? (Use a negative number.)

Answer: -126

$-9 \times 14 = -126$ m.

- 58** A bank charges \$6 for every day an account is overdrawn. After some days the charges total \$150. For how many days was the account overdrawn?

Answer: 25

$-150 \div (-6) = 25$ days.

- 59** A weather balloon's temperature reading changes by -2°C for every 300 m it rises. It rises 2100 m. What is the total change, in $^\circ\text{C}$?

Answer: -14

$2100 \div 300 = 7$ steps, and $7 \times (-2) = -14^\circ\text{C}$.

- 60** Three people each owe \$24. What is the total debt, in dollars? Give your answer as a negative number.

Answer: -72

$3 \times (-24) = -72$.