Grade 5 Unit 1 quiz 2: Multiplying a decimal by ten, one hundred or one thousand, Dividing a decimal by ten, one hundred or one thousand, Numbers in other bases (answer key)

8 questions, 19 points

ANSWERS AT A GLANCE

1. 308 dollars
2. (a) 5.9 (b) 208.3 (c) 460 (d) 7,100
3. (a) 1,000 links (b) 10^3
4. 0.392; the 3 moves from the tens place to the tenths place.
5. (a) 0.407 (b) 0.003 (c) 25
6. Bag: 0.33 dollars a pom-pom; tub: 0.27 dollars a pom-pom. The tub costs less per pom-pom.
7. Omar has 6 more stickers ($241_{\text{five}} = 71$).
8. 18 = 1 × 16 + 0 × 8 + 0 × 4 + 1 × 2 + 0 × 1, so light each bulb with a 1: 10010_{two}.

WORKED SOLUTIONS

1. The garden club buys 100 bags of soil. Each bag costs 2.92 dollars. The club has 600 dollars to spend. How much money is left after buying the soil? (2 points)

ANSWER

308 dollars

SOLUTION

The soil costs 2.92 × 100 dollars. Every digit moves two places left, so the soil costs 292 dollars.

Money left: 600 − 292 = 308 dollars.

SCORING

1 point for the cost of the soil, 292 dollars; 1 point for 308 dollars left.

2. Multiply. (4 points)

(a) 0.59 × 10 (b) 2.083 × 100 (c) 0.46 × 1,000 (d) 7.1×10^3

ANSWER

(a) 5.9 (b) 208.3 (c) 460 (d) 7,100

SOLUTION

(a) One place left: the 5 goes to ones and the 9 to tenths: 5.9.

(b) Two places left: the 2 goes to hundreds, the 0 to tens, the 8 to ones and the 3 to tenths: 208.3.

(c) Three places left: 4 tenths become 4 hundreds and 6 hundredths become 6 tens. The ones place gets a 0: 460.

(d) $10^3 = 1{,}000$, three places: 7 ones become 7 thousands and 1 tenth becomes 1 hundred. The tens and ones get zeros: 7,100.

SCORING

1 point for each correct product.

3. Aisha's class makes a paper chain. Each link uses 0.2 meters of paper strip. The whole chain used 200 meters of strip. (2 points)

(a) How many links are in the chain?

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(b) Write that number as a power of ten.

ANSWER

(a) 1,000 links (b) 10^3

SOLUTION

(a) The number of links times 0.2 is 200, so the question is 0.2 × $\square$ = 200. Follow the 2: it is in the tenths in 0.2 and in the hundreds in 200. Tenths to ones, to tens, to hundreds is three places, so the chain has 1,000 links. Check: 0.2 × 1,000 = 200. (Counting the two zeros of 200 would give 100, which is wrong.)

(b) $1{,}000 = 10^3$.

SCORING

1 point for 1,000 links; 1 point for 10^3.

4. Find $39.2 \div 10^2$. Then name the place the digit 3 is in before you divide, and the place it is in after. (2 points)

ANSWER

0.392; the 3 moves from the tens place to the tenths place.

SOLUTION

$10^2 = 100$, so every digit moves two places to the right. The tens digit 3 goes to the tenths, the ones digit 9 to the hundredths and the tenths digit 2 to the thousandths. The ones place is empty and gets a zero:

$$39.2 \div 10^2 = 0.392$$

The 3 moves from the tens place to the tenths place.

SCORING

1 point for 0.392; 1 point for naming the tens place and the tenths place.

5. Divide. Watch for empty places and for zeros you can drop.

(a) 4.07 ÷ 10 (b) 3 ÷ 1,000 (c) 2,500 ÷ 100 (3 points)

ANSWER

(a) 0.407 (b) 0.003 (c) 25

SOLUTION

(a) Every digit moves one place right, the zero too: 4 ones become 4 tenths, 0 tenths become 0 hundredths, 7 hundredths become 7 thousandths. 4.07 ÷ 10 = 0.407.

(b) The 3 moves three places, from the ones to the thousandths. The tenths and hundredths are empty and get zeros: 3 ÷ 1,000 = 0.003.

(c) Every digit moves two places: 2 thousands become 2 tens, 5 hundreds become 5 ones, and the two zeros land in the tenths and hundredths. 2,500 ÷ 100 = 25.00 = 25, since the end zeros are worth nothing.

SCORING

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1 point for each of 0.407, 0.003 and 25 (25.00 also earns the point).

6. A craft shop sells pom-poms in a bag of 10 for 3.30 dollars, or in a tub of 100 for 27 dollars. Find the price of one pom-pom each way. Which way costs less per pom-pom? (2 points)

ANSWER

Bag: 0.33 dollars a pom-pom; tub: 0.27 dollars a pom-pom. The tub costs less per pom-pom.

SOLUTION

Bag: 3.30 ÷ 10. Every digit moves one place right, and the end zero drops off: 0.33 dollars a pom-pom.

Tub: 27 ÷ 100. Every digit moves two places right, so the tens digit lands in the tenths: 0.27 dollars a pom-pom.

Compare 0.33 and 0.27 by their tenths digits, then hundredths. 0.27 is less, so the tub costs less per pom-pom.

SCORING

1 point for both prices per pom-pom, 0.33 and 0.27 dollars; 1 point for choosing the tub.

7. Lily writes how many stickers she has in base five: 241_{five}. Omar has 77 stickers. Who has more stickers, and how many more? (2 points)

ANSWER

Omar has 6 more stickers ($241_{\text{five}} = 71$).

SOLUTION

Write Lily's number in base ten. The places from the right are worth 1, 5 and 25:

$$241_{\text{five}} = 2 \times 25 + 4 \times 5 + 1 = 50 + 20 + 1 = 71.$$

Omar has 77, and 77 − 71 = 6. So Omar has 6 more stickers, even though Lily's digits look bigger.

SCORING

1 point for $241_{\text{five}} = 71$; 1 point for Omar, with 6 more stickers.

8. Hiro's light board has five bulbs in a row. From left to right they are worth 16, 8, 4, 2 and 1. A lit bulb counts its value and a dark bulb counts nothing. Hiro wants the board to show 18. Which bulbs should be lit? Write 18 in base two. (2 points)

ANSWER

18 = 1 × 16 + 0 × 8 + 0 × 4 + 1 × 2 + 0 × 1, so light each bulb with a 1: 10010_{two}.

SOLUTION

The 16 bulb fits, since the next place, 32, is too big. Take 16, then take each smaller bulb that still fits in what is left:

$$18 = 1 \times 16 + 0 \times 8 + 0 \times 4 + 1 \times 2 + 0 \times 1.$$

A lit bulb is a 1 and a dark bulb is a 0. Reading the bulbs left to right gives 10010_{two}.

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SCORING

1 point for the right bulbs, whose values add to 18; 1 point for 10010_{two}.

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