Chapter 3: A Peek Beyond the Point

CONTENTS 8 exercises · 47 questions

3.1	Measure Objects and Write Lengths (Page 47)	1 Q
3.2	Lengths in Two Ways and Increasing Order (Page 49)	6 Q
3.3	Number Line Readings and Longest-Shortest (Pages 53–56)	4 Q
3.4	Place Value Table and Decimal Notation (Pages 61–64)	3 Q
3.5	Units of Measurement — Length, Weight, Money (Pages 64–69)	5 Q
3.6	Locating and Comparing Decimals (Pages 69–73)	9 Q
3.7	Addition and Subtraction of Decimals (Pages 74–76)	4 Q
3.8	More on the Decimal System — Figure it Out (Pages 78–80)	15 Q

Exercise 3.1 — Measure Objects and Write Lengths (Page 47)

Q1 Write the measurements of the objects shown in the picture (eraser, pencil, chalk placed above a ruler).

SOLUTION

Reading from the ruler in the picture:
Eraser: The end falls at the 2 and 4/10 mark → length = 2 4/10 cm
Pencil: The end falls at the 4 mark → length = 4 cm (or 4 0/10 cm)
Chalk: The end falls at the 1 and 5/10 mark → length = 1 5/10 cm

Answer: Eraser = 2 4/10 cm, Pencil = 4 cm, Chalk = 1 5/10 cm

Exercise 3.2 — Lengths in Two Ways and Increasing Order (Page 49)

Q1 Arrange the following lengths in increasing order: (a) 9/10, (b) 1 7/10, (c) 130/10, (d) 13 1/10, (e) 10 5/10, (f) 7 6/10, (g) 6 7/10, (h) 4/10.

SOLUTION

Convert each to decimal to compare:
9/10 = 0.9, 1 7/10 = 1.7, 130/10 = 13.0, 13 1/10 = 13.1,
10 5/10 = 10.5, 7 6/10 = 7.6, 6 7/10 = 6.7, 4/10 = 0.4

Arranging in increasing order:
0.4 < 0.9 < 1.7 < 6.7 < 7.6 < 10.5 < 13.0 < 13.1

Answer: 4/10 < 9/10 < 1 7/10 < 6 7/10 < 7 6/10 < 10 5/10 < 130/10 < 13 1/10

Q2 Arrange the following lengths in increasing order: 4 1/10, 4/10, 41/10, 41 1/10.

SOLUTION

Convert each to decimal:
4 1/10 = 4.1, 4/10 = 0.4, 41/10 = 4.1, 41 1/10 = 41.1

Note: 4 1/10 = 4.1 and 41/10 = 4.1 are equal.
Arranging in increasing order: 0.4 < 4.1 = 4.1 < 41.1

Answer: 4/10 < 4 1/10 = 41/10 < 41 1/10

Q3 The lengths of the body parts of a honeybee are given. Find its total length. Head: 2 3/10 units, Thorax: 5 4/10 units, Abdomen: 7 5/10 units.

SOLUTION

Total = Head + Thorax + Abdomen
= (2 + 5 + 7) units + (3 + 4 + 5) one-tenths
= 14 units + 12 one-tenths
= 14 units + 1 unit + 2 one-tenths
= 15 units and 2 one-tenths
= 15 2/10 units

Answer: Total length = 15 2/10 units

Q4 The length of Shylaja's hand is 12 4/10 units and her palm is 6 7/10 units. What is the length of the longest (middle) finger?

SOLUTION

Finger length = Hand length − Palm length
= (12 + 4/10) − (6 + 7/10)
= (12 − 6) + (4/10 − 7/10)

Since 4/10 < 7/10, we borrow 1 unit from 12:
= (11 − 6) + (14/10 − 7/10)
= 5 + 7/10
= 5 7/10 units

Answer: Length of middle finger = 5 7/10 units

Q5 A Celestial Pearl Danio's length is 2 4/10 cm, and the length of a Philippine Goby is 9/10 cm. What is the difference in their lengths?

SOLUTION

Difference = 2 4/10 − 9/10
= (2 units + 4 one-tenths) − 9 one-tenths

Borrow 1 unit: = (1 unit + 14 one-tenths) − 9 one-tenths
= 1 unit + 5 one-tenths
= 1 5/10 cm

Answer: Difference = 1 5/10 cm

Q6 Observe the given sequences of numbers. Identify the change after each term and extend the pattern with 4 more terms: (a) 4, 4 3/10, 4 6/10, … (b) 8 2/10, 8 7/10, 9 2/10, … (c) 7 6/10, 8 7/10, … (d) 5 7/10, 5 3/10, … (e) 13 5/10, 13, 12 5/10, … (f) 11 5/10, 10 4/10, 9 3/10, …

SOLUTION

(a) Pattern: each term increases by 3/10.
4, 4 3/10, 4 6/10, 4 9/10, 5 2/10, 5 5/10, 5 8/10

(b) Pattern: each term increases by 5/10.
8 2/10, 8 7/10, 9 2/10, 9 7/10, 10 2/10, 10 7/10, 11 2/10

(c) Pattern: each term increases by 1 1/10 (= 11/10).

7 6/10, 8 7/10, 9 8/10, 10 9/10, 12, 13 1/10

(d) Pattern: each term decreases by 4/10.
5 7/10, 5 3/10, 4 9/10, 4 5/10, 4 1/10, 3 7/10

(e) Pattern: each term decreases by 5/10.
13 5/10, 13, 12 5/10, 12, 11 5/10, 11, 10 5/10

(f) Pattern: each term decreases by 1 1/10.
11 5/10, 10 4/10, 9 3/10, 8 2/10, 7 1/10, 6, 4 9/10

Answer: (a) +3/10: 4 9/10, 5 2/10, 5 5/10, 5 8/10 | (b) +5/10: 9 7/10, 10 2/10, 10 7/10, 11 2/10 | (c) +11/10: 9 8/10, 10 9/10, 12, 13 1/10 | (d) −4/10: 4 9/10, 4 5/10, 4 1/10, 3 7/10 | (e) −5/10: 12, 11 5/10, 11, 10 5/10 | (f) −11/10: 8 2/10, 7 1/10, 6, 4 9/10

Exercise 3.3 — Number Line Readings and Longest-Shortest (Pages 53–56)

Q1 Observe the figure. Notice the markings and the corresponding lengths written in the boxes when measured from 0. Fill the lengths in the empty boxes. (A number line with markings at 0, 1/10, 2/10, 1, 1 3/10, 2, showing 1/100, 20/100, 99/100, 130/100 in boxes.)

SOLUTION

The number line marks units and tenths; each small division is one hundredth, so a length is measured from 0 in hundredths.

The already-filled boxes give the pattern: the mark at 1/100 shows 1/100, the mark at 2/10 shows 20/100, the mark just before 1 shows 99/100, and the mark at 1 3/10 shows 130/100.

Filling the empty boxes the same way (count the hundredths from 0):
• Mark at 3/10 → 30/100.
• Mark at 2 units → 200/100.

Answer: Empty boxes (left to right): 30/100 and 200/100

Q2 For the lengths shown below write the measurements and read out the measures in words. (Four wires of different lengths shown against rulers.)

SOLUTION

Reading each wire length from the rulers:
Wire 1 (scale 5 to 6 region): end is at 5 37/100 → 5 and 37 one-hundredths.
Wire 2 (scale 14 to 15 region): end is at 15 3/100 → 15 and 3 one-hundredths.
Wire 3 (scale 6 to 7 region): end is at 7 52/100 → 7 and 52 one-hundredths.
Wire 4 (scale 9 to 10 region): end is at 9 80/100 → 9 and 80 one-hundredths.

Answer: 5 37/100 (five and thirty-seven hundredths); 15 3/100 (fifteen and three hundredths); 7 52/100 (seven and fifty-two hundredths); 9 80/100 (nine and eighty hundredths)

Q3 In each group, identify the longest and the shortest lengths. (a) 3/10, 3/100, 33/100. (b) 3 1/10, 30/10, 1 3/10. (c) 45/100, 54/100, 5/10, 4/10. (d) 3 6/10, 3 6/100, 3 6/10 6/100. (e) 8/10, 2/100, 9/100, 1 8/100. (f) 7 3/10 5/100, 7 5/10, 7 41/100. (g) 65/10, 15/100, 5 87/100, 5 7/100.

SOLUTION

(a) 3/10 = 0.30, 3/100 = 0.03, 33/100 = 0.33
Longest: 33/100 = 0.33; Shortest: 3/100 = 0.03

(b) 3 1/10 = 3.1, 30/10 = 3.0, 1 3/10 = 1.3
Longest: 3 1/10 = 3.1; Shortest: 1 3/10 = 1.3

(c) 45/100 = 0.45, 54/100 = 0.54, 5/10 = 0.5, 4/10 = 0.4
Longest: 54/100 = 0.54; Shortest: 4/10 = 0.4

(d) 3 6/10 = 3.6, 3 6/100 = 3.06, 3 6/10 6/100 = 3.66
Longest: 3 6/10 6/100 = 3.66; Shortest: 3 6/100 = 3.06

(e) 8/10 = 0.8, 2/100 = 0.02, 9/100 = 0.09, 1 8/100 = 1.08
Longest: 1 8/100 = 1.08; Shortest: 2/100 = 0.02

(f) 7 3/10 5/100 = 7.35, 7 5/10 = 7.5, 7 41/100 = 7.41
Longest: 7 5/10 = 7.5; Shortest: 7 3/10 5/100 = 7.35

(g) 65/10 = 6.5, 15/100 = 0.15, 5 87/100 = 5.87, 5 7/100 = 5.07
Longest: 65/10 = 6.5; Shortest: 15/100 = 0.15

Answer: (a) Longest=33/100, Shortest=3/100 | (b) Longest=3 1/10, Shortest=1 3/10 | (c) Longest=54/100, Shortest=4/10 | (d) Longest=3 66/100, Shortest=3 6/100 | (e) Longest=1 8/100, Shortest=2/100 | (f) Longest=7 5/10, Shortest=7 35/100 | (g) Longest=65/10, Shortest=15/100

Q4 Find the sums and differences: (a) 3/10 + 3 4/100, (b) 9 5/10 7/100 + 2 1/10 3/100, (c) 15 6/10 4/100 + 14 3/10 6/100, (d) 7 7/100 − 4 4/100, (e) 8 6/100 − 5 3/100, (f) 12 6/10 2/100 − 9/10 9/100.

SOLUTION

(a) 3/10 + 3 4/100
= 3/10 + 3 + 4/100
= 3 + 3/10 + 4/100
= 3 34/100

(b) 9 5/10 7/100 + 2 1/10 3/100

Tenths: 5 + 1 = 6; Hundredths: 7 + 3 = 10 → 1 tenth carry
Tenths total: 6 + 1 = 7; Units: 9 + 2 = 11
= 11 7/10 0/100 = 11 7/10

(c) 15 6/10 4/100 + 14 3/10 6/100
Hundredths: 4 + 6 = 10 → 0 hundredths + 1 tenth carry
Tenths: 6 + 3 + 1 = 10 → 0 tenths + 1 unit carry
Units: 15 + 14 + 1 = 30
= 30

(d) 7 7/100 − 4 4/100
Hundredths: 7 − 4 = 3; Units: 7 − 4 = 3
= 3 3/100

(e) 8 6/100 − 5 3/100
Hundredths: 6 − 3 = 3; Units: 8 − 5 = 3
= 3 3/100

(f) 12 6/10 2/100 − 9/10 9/100
Hundredths: 2 − 9 → borrow 1 tenth: 12 − 9 = 3
Tenths: 6 − 1(borrow) − 9 → borrow 1 unit: 15 − 9 = 6
Units: 12 − 1(borrow) − 0 = 11
= 11 6/10 3/100 = 11 63/100

Answer: (a) 3 34/100 | (b) 11 7/10 | (c) 30 | (d) 3 3/100 | (e) 3 3/100 | (f) 11 63/100

Exercise 3.4 — Place Value Table and Decimal Notation (Pages 61–64)

Q1 How many thousandths make: (a) one unit, (b) one tenth, (c) one hundredth, (d) one ten, (e) one hundred?

SOLUTION

(a) 1 unit = 10 tenths = 100 hundredths = 1000 thousandths → 1000
(b) 1 tenth = 10 hundredths = 100 thousandths → 100
(c) 1 hundredth = 10 thousandths → 10
(d) 1 ten = 10 units = 10 × 1000 thousandths = 10,000 thousandths → 10,000
(e) 1 hundred = 100 units = 100 × 1000 thousandths = 1,00,000 thousandths → 1,00,000

Answer: (a) 1000 | (b) 100 | (c) 10 | (d) 10,000 | (e) 1,00,000

Q2 Make a place value table. Write each quantity in decimal form and in terms of place value, and read the number: (a) 2 ones, 3 tenths and 5 hundredths, (b) 1 ten and 5 tenths, (c) 4 ones and 6 hundredths, (d) 1 hundred, 1 one and 1 hundredth, (e) 8/100 and 9/10, (f) 5/100, (g) 1/10, (h) 2 1/100, 4 1/10, and 7 7/1000.

SOLUTION

(a) 2 + 3/10 + 5/100 = 2.35; read: two point three five (two and thirty-five hundredths)

(b) 10 + 5/10 = 10.5; read: ten point five (ten and five tenths)

(c) 4 + 0/10 + 6/100 = 4.06; read: four point zero six (four and six hundredths)

(d) 100 + 0 + 1 + 0/10 + 1/100 = 101.01; read: one hundred one point zero one (one hundred one and one hundredth)

(e) 9/10 + 8/100 = 0.98; read: zero point nine eight (ninety-eight hundredths)

(f) 5/100 = 0.05; read: zero point zero five (five hundredths)

(g) 1/10 = 0.1; read: zero point one (one tenth)

(h) This gives three separate numbers:
2 + 1/100 = 2.01 (two point zero one)
4 + 1/10 = 4.1 (four point one)
7 + 7/1000 = 7.007 (seven point zero zero seven)

Answer: (a) 2.35 | (b) 10.5 | (c) 4.06 | (d) 101.01 | (e) 0.98 | (f) 0.05 | (g) 0.1 | (h) 2.01, 4.1, 7.007

Q3 Write these quantities in decimal form: (a) 234 hundredths, (b) 105 tenths.

SOLUTION

(a) 234 hundredths = 234/100 = 200/100 + 30/100 + 4/100 = 2 + 3/10 + 4/100 = 2.34

(b) 105 tenths = 105/10 = 100/10 + 5/10 = 10 + 5/10 = 10.5

Answer: (a) 2.34 | (b) 10.5

Exercise 3.5 — Units of Measurement — Length, Weight, Money (Pages 64–69)

Q1 Fill in the blanks (mm ↔ cm): 12 mm = 1.2 cm, 56 mm = 5.6 cm, 70 mm = ___, ___ = 0.9 cm, 134 mm = ___, ___ = 203.6 cm.

SOLUTION

Since 1 mm = 1/10 cm = 0.1 cm:

70 mm = 70/10 cm = 7.0 cm
0.9 cm = 9/10 cm = 9 mm
134 mm = 134/10 cm = 13.4 cm
203.6 cm = 2036/10 mm = 2036 mm

Answer: 70 mm = 7.0 cm; 9 mm = 0.9 cm; 134 mm = 13.4 cm; 2036 mm = 203.6 cm

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Q2 Fill in the blanks (cm ↔ m): 36 cm = ___, 50 cm = ___, ___ = 0.89 m, 4 cm = ___, 325 cm = ___, ___ = 2.07 m.

SOLUTION

Since 1 cm = 1/100 m = 0.01 m:

36 cm = 36/100 m = 0.36 m
50 cm = 50/100 m = 0.5 m
0.89 m = 89/100 m = 89 cm
4 cm = 4/100 m = 0.04 m
325 cm = 325/100 m = 3.25 m
2.07 m = 207/100 m = 207 cm

Answer: 36 cm = 0.36 m; 50 cm = 0.5 m; 89 cm = 0.89 m; 4 cm = 0.04 m; 325 cm = 3.25 m; 207 cm = 2.07 m

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Q3 How many mm does 1 metre have? Can we write 1 mm = 1/1000 m?

SOLUTION

1 m = 100 cm and 1 cm = 10 mm, so:
1 m = 100 × 10 mm = 1000 mm.

Since 1 mm = 1/1000 m, yes, 1 mm = 1/1000 m = 0.001 m.

Answer: 1 m = 1000 mm; Yes, 1 mm = 1/1000 m

Q4 Fill in the blanks (g ↔ kg): 465 g = ___, 68 g = ___, 1560 g = ___, 704 g = ___, ___ = 0.56 kg, ___ = 2.5 kg.

SOLUTION

Since 1 g = 1/1000 kg = 0.001 kg:

465 g = 465/1000 kg = 0.465 kg
68 g = 68/1000 kg = 0.068 kg
1560 g = 1560/1000 kg = 1.56 kg
704 g = 704/1000 kg = 0.704 kg
0.56 kg = 560/1000 kg = 560 g
2.5 kg = 2500/1000 kg = 2500 g

Answer: 465 g = 0.465 kg; 68 g = 0.068 kg; 1560 g = 1.56 kg; 704 g = 0.704 kg; 560 g = 0.56 kg; 2500 g = 2.5 kg

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Q5 Fill in the blanks (rupee ↔ paise): 10 p = ___, ___ p = 0.05, ___ p = 0.36, ___ = 0.50, 99 p = ___, 250 p = ___.

SOLUTION

Since 1 paisa = 1/100 rupee = 0.01:

10 p = 10/100 rupee = 0.10
0.05 = 5/100 rupee = 5 p
0.36 = 36/100 rupee = 36 p
0.50 = 50/100 rupee = 50 p
99 p = 99/100 rupee = 0.99
250 p = 250/100 rupee = 2.50

Answer: 10 p = 0.10; 5 p = 0.05; 36 p = 0.36; 50 p = 0.50; 99 p = 0.99; 250 p = 2.50

Exercise 3.6 — Locating and Comparing Decimals (Pages 69–73)

Q1 Name all the divisions between 1 and 1.1 on the number line.

SOLUTION

The segment from 1 to 1.1 represents 1 tenth.
If this tenth is divided into 10 equal parts, each part = 1/100.
The division marks between 1 and 1.1 are:
1.01, 1.02, 1.03, 1.04, 1.05, 1.06, 1.07, 1.08, 1.09

Answer: 1.01, 1.02, 1.03, 1.04, 1.05, 1.06, 1.07, 1.08, 1.09

Q2 Identify and write the decimal numbers against the letters A, B, C, D on the number line (marks near 5, 5.1, 5.3, 5.4).

SOLUTION

The number line runs from 5 to 5.4, with each tenth divided into 10 small parts (hundredths).
Reading each labelled arrow from the figure:
A is just before 5.1, at the 9th small division after 5.0 → A = 5.09
B is just past 5.1, at the 3rd small division → B = 5.13
C is at 5.2 → C = 5.2
D is just past 5.3, at the 1st small division → D = 5.31

Answer: A = 5.09, B = 5.13, C = 5.2, D = 5.31

Q3 Can you tell which of 0.2, 0.20, 0.200, 0.02, 0.002 is the smallest and which is the largest?

SOLUTION

0.2 = 0.20 = 0.200 (all represent 2 tenths — trailing zeros after decimal do not change value)
0.02 = 2 hundredths = 0.020
0.002 = 2 thousandths

Comparing: 0.002 < 0.02 < 0.2
Largest: 0.2 (= 0.20 = 0.200)
Smallest: 0.002

Answer: Largest: 0.2 (= 0.20 = 0.200); Smallest: 0.002

Q4 Which of these are the same: 4.5, 4.05, 0.405, 4.050, 4.50, 4.005, 04.50?

SOLUTION

Compare by place value:
4.5 and 4.50 and 04.50 all equal 4 units + 5 tenths = 4.5 (same value).
4.05 and 4.050 both equal 4 units + 0 tenths + 5 hundredths = 4.05 (same value).
0.405 = 0 units + 4 tenths + 0 hundredths + 5 thousandths (different).
4.005 = 4 units + 0 tenths + 0 hundredths + 5 thousandths (different).

Answer: 4.5 = 4.50 = 04.50 (same); 4.05 = 4.050 (same)

Q5 Identify the decimal number denoted by '?' in the last number line of Figure (b), where the innermost number line runs between 3.05 and 3.06.

SOLUTION

Figure (b) shows four nested number lines, each zooming into the segment holding the number.
Outermost (0 to 10): the marked point lies between 3 and 4.
Next level (3 to 4): the point lies between 3 and 3.1.
Next level (3 to 3.1): the point lies between 3.05 and 3.06.
Innermost (3.05 to 3.06): this tenth-of-a-tenth is split into 10 parts (thousandths); the marker is at the 9th division after 3.05.
$3.05 + 9 \times 0.001 = 3.059$
So ? = 3.059

Answer: ? = 3.059

Q6 In the number line from 5 to 10, what decimal numbers do boxes 'a', 'b', and 'c' denote? (b = 7.5 is given.)

SOLUTION

The number line spans from 5 to 10, a range of 5 units, divided into 10 equal parts.
Each division = 5/10 = 0.5 units.

'b' is at the 5th mark from 5: $5 + 5 \times 0.5 = 7.5$ (given, confirmed).
'a' is at the 2nd mark from 5: $5 + 2 \times 0.5 = 6$.
'c' is at the 9th mark from 5: $5 + 9 \times 0.5 = 9.5$

Answer: a = 6, b = 7.5, c = 9.5

Q7 Using similar reasoning find the decimal numbers in boxes d, e (between 8 and 8.1) and f, g, h (between 4.3 and 4.8).

SOLUTION

For d and e (between 8 and 8.1, range = 0.1, divided into 10 parts → each part = 0.01):
d is at the 1st mark from 8: 8 + 1 × 0.01 = 8.01
e is at the 5th mark from 8: 8 + 5 × 0.01 = 8.05

For f, g, h (between 4.3 and 4.8, range = 0.5, divided into 10 parts → each = 0.05):
f is at the 1st mark from 4.3: 4.3 + 1 × 0.05 = 4.35
g is at the 4th mark from 4.3: 4.3 + 4 × 0.05 = 4.5
h is at the 11th mark from 4.3 (past 4.8): 4.3 + 11 × 0.05 = 4.85

Answer: d = 8.01, e = 8.05; f = 4.35, g = 4.5, h = 4.85

Q8 Which decimal number is greater? (a) 1.23 or 1.32, (b) 3.81 or 13.800, (c) 1.009 or 1.090.

SOLUTION

(a) 1.23 vs 1.32: Both have 1 unit. Tenths: 2 < 3. So 1.32 > 1.23.

(b) 3.81 vs 13.800: 13.800 has 13 units vs 3 units. So 13.800 > 3.81.

(c) 1.009 vs 1.090: Both have 1 unit and 0 tenths. Hundredths: 0 < 9. So 1.090 > 1.009.

Answer: (a) 1.32 | (b) 13.800 | (c) 1.090

Q9 Consider 0.9, 1.1, 1.01, 1.11. (a) Which is closest to 1.09? (b) Which among 3.56, 3.65, 3.099 is closest to 4? (c) Which among 0.8, 0.69, 1.08 is closest to 1?

SOLUTION

(a) Distances from 1.09: $|0.9-1.09|=0.19$, $|1.1-1.09|=0.01$, $|1.01-1.09|=0.08$, $|1.11-1.09|=0.02$.
Smallest distance: 1.1 (distance 0.01). → 1.1 is closest to 1.09.

(b) Distances from 4: $|3.56-4|=0.44$, $|3.65-4|=0.35$, $|3.099-4|=0.901$.
Smallest distance: 3.65 (distance 0.35). → 3.65 is closest to 4.

(c) Distances from 1: $|0.8-1|=0.2$, $|0.69-1|=0.31$, $|1.08-1|=0.08$.
Smallest distance: 1.08 (distance 0.08). → 1.08 is closest to 1.

Answer: (a) 1.1 | (b) 3.65 | (c) 1.08

Exercise 3.7 — Addition and Subtraction of Decimals (Pages 74–76)

Q1 Find the sums: (a) 5.3 + 2.6, (b) 18 + 8.8, (c) 2.15 + 5.26, (d) 9.01 + 9.10, (e) 29.19 + 9.91, (f) 0.934 + 0.6, (g) 0.75 + 0.03, (h) 6.236 + 0.487.

SOLUTION

(a) 5.3 + 2.6: Tenths 3+6=9; Units 5+2=7. = 7.9

(b) 18 + 8.8: Write 18 = 18.0; 18.0 + 8.8 = 26.8

(c) 2.15 + 5.26: Hundredths 5+6=11 → write 1 carry 1; Tenths 1+2+1=4; Units 2+5=7. = 7.41

(d) 9.01 + 9.10: Hundredths 1+0=1; Tenths 0+1=1; Units 9+9=18 → 18.11

(e) 29.19 + 9.91: Hundredths 9+1=10 → 0 carry 1; Tenths 1+9+1=11 → 1 carry 1; Units 9+9+1=19 → 9 carry 1; Tens 2+0+1=3. = 39.10

(f) 0.934 + 0.6 = 0.934 + 0.600: Thousandths 4; Hundredths 3; Tenths 9+6=15 → 5 carry 1; Units 0+0+1=1. = 1.534

(g) 0.75 + 0.03: Hundredths 5+3=8; Tenths 7+0=7. = 0.78

(h) 6.236 + 0.487: Thousandths 6+7=13 → 3 carry 1; Hundredths 3+8+1=12 → 2 carry 1; Tenths 2+4+1=7; Units 6+0=6. = 6.723

Answer: (a) 7.9 | (b) 26.8 | (c) 7.41 | (d) 18.11 | (e) 39.10 | (f) 1.534 | (g) 0.78 | (h) 6.723

Q2 Find the differences: (a) 5.6 − 2.3, (b) 18 − 8.8, (c) 10.4 − 4.5, (d) 17 − 16.198, (e) 17 − 0.05, (f) 34.505 − 18.1, (g) 9.9 − 9.09, (h) 6.236 − 0.487.

SOLUTION

(a) 5.6 − 2.3: Tenths 6−3=3; Units 5−2=3. = 3.3

(b) 18 − 8.8 = 18.0 − 8.8: Tenths 0−8 → borrow: 10−8=2; Units 8−1−8 → borrow: 18−1−8=9. = 9.2

(c) 10.4 − 4.5: Tenths 4−5 → borrow 1 unit: 14−5=9; Units 9(after borrow)−4=5. = 5.9

(d) 17 − 16.198 = 17.000 − 16.198: Thousandths 0−8 → borrow: 10−8=2; Hundredths 0−1−9 → borrow: 10−1−9=0; Tenths 0−1−1 → borrow: 10−1−1=8; Units 7−1−6=0; Tens 1−1=0. = 0.802

(e) 17 − 0.05 = 17.00 − 0.05: Hundredths 0−5 → borrow: 10−5=5; Tenths 0−1−0 →

borrow: 10−0−1=9; Units 7−1−0=6; Tens: 1. = 16.95

(f) 34.505 − 18.1 = 34.505 − 18.100: Thousandths 5; Hundredths 0; Tenths 5−1=4; Units 4−8 → borrow 1 ten: 14−8=6; Tens 3−1(borrow)−1=1. = 16.405

(g) 9.9 − 9.09 = 9.90 − 9.09: Hundredths 0−9 → borrow: 10−9=1; Tenths 9−1−0=8; Units 9−9=0. = 0.81

(h) 6.236 − 0.487: Thousandths 6−7 → borrow: 16−7=9; Hundredths 3−1−8 → borrow: 13−1−8=4; Tenths 2−1−4 → borrow: 12−1−4=7; Units 6−1−0=5. = 5.749

Answer: (a) 3.3 | (b) 9.2 | (c) 5.9 | (d) 0.802 | (e) 16.95 | (f) 16.405 | (g) 0.81 | (h) 5.749

Q3 Continue this sequence and write the next 3 terms: 4.4, 4.8, 5.2, 5.6, 6.0, …

SOLUTION

The common difference is 4.8 − 4.4 = 0.4.
Next three terms:
6.0 + 0.4 = 6.4
6.4 + 0.4 = 6.8
6.8 + 0.4 = 7.2

Answer: 6.4, 6.8, 7.2

Q4 Identify the change and write the next 3 terms for each sequence: (a) 4.4, 4.45, 4.5, … (b) 25.75, 26.25, 26.75, … (c) 10.56, 10.67, 10.78, … (d) 13.5, 16, 18.5, … (e) 8.5, 9.4, 10.3, … (f) 5, 4.95, 4.90, … (g) 12.45, 11.95, 11.45, … (h) 36.5, 33, 29.5, …

SOLUTION

(a) Difference: 4.45 − 4.4 = 0.05. Next: 4.55, 4.60, 4.65

(b) Difference: 26.25 − 25.75 = 0.50. Next: 27.25, 27.75, 28.25

(c) Difference: 10.67 − 10.56 = 0.11. Next: 10.89, 11.00, 11.11

(d) Difference: 16 − 13.5 = 2.5. Next: 21.0, 23.5, 26.0

(e) Difference: 9.4 − 8.5 = 0.9. Next: 11.2, 12.1, 13.0

(f) Difference: 4.95 − 5 = −0.05. Next: 4.85, 4.80, 4.75

(g) Difference: 11.95 − 12.45 = −0.50. Next: 10.95, 10.45, 9.95

(h) Difference: 33 − 36.5 = −3.5. Next: 26.0, 22.5, 19.0

Answer: (a) 4.55, 4.60, 4.65 | (b) 27.25, 27.75, 28.25 | (c) 10.89, 11.00, 11.11 | (d) 21.0, 23.5, 26.0 | (e) 11.2, 12.1, 13.0 | (f) 4.85, 4.80, 4.75 | (g) 10.95, 10.45, 9.95 | (h) 26.0, 22.5, 19.0

Exercise 3.8 — More on the Decimal System — Figure it Out (Pages 78–80)

Q1 Convert the following fractions into decimals: (a) 5/100, (b) 16/1000, (c) 12/10, (d) 254/1000.

SOLUTION

(a) 5/100 = 0.05 (5 hundredths)

(b) 16/1000 = 0.016 (16 thousandths = 0 tenths, 1 hundredth, 6 thousandths)

(c) 12/10 = 10/10 + 2/10 = 1 + 2/10 = 1.2

(d) 254/1000 = 200/1000 + 50/1000 + 4/1000 = 2/10 + 5/100 + 4/1000 = 0.254

Answer: (a) 0.05 | (b) 0.016 | (c) 1.2 | (d) 0.254

Q2 Convert the following decimals into a sum of tenths, hundredths and thousandths: (a) 0.34, (b) 1.02, (c) 0.8, (d) 0.362.

SOLUTION

(a) 0.34 = 3/10 + 4/100 + 0/1000

(b) 1.02 = 1 + 0/10 + 2/100 + 0/1000

(c) 0.8 = 8/10 + 0/100 + 0/1000

(d) 0.362 = 3/10 + 6/100 + 2/1000

Answer: (a) 3/10 + 4/100 | (b) 1 + 0/10 + 2/100 | (c) 8/10 | (d) 3/10 + 6/100 + 2/1000

Q3 What decimal number does each letter represent in the number line (from 6.4 to 6.6, with marks at a, c, b)?

SOLUTION

The number line spans from 6.4 to 6.6, with 6.5 marked in the middle.
Reading each labelled arrow from the figure:
a lies between 6.4 and 6.5, halfway to 6.5 → a = 6.45
c lies between 6.5 and 6.6, a quarter of the way past 6.5 → c = 6.525
b lies just past c, halfway between 6.5 and 6.6 → b = 6.55

Answer: a = 6.45, c = 6.525, b = 6.55

Q4 Arrange the following quantities in descending order: (a) 11.01, 1.011, 1.101, 11.10, 1.01 (b) 2.567, 2.675, 2.768, 2.499, 2.698 (c) 4.678 g, 4.595 g, 4.600 g, 4.656 g, 4.666 g (d) 33.13 m, 33.31 m, 33.133 m, 33.331 m, 33.313 m.

SOLUTION

(a) Compare: 11.10, 11.01, 1.101, 1.011, 1.01
Descending: 11.10 > 11.01 > 1.101 > 1.011 > 1.01

(b) All have 2 units and 6xx hundredths range.
Descending: 2.768 > 2.698 > 2.675 > 2.567 > 2.499

(c) All near 4.6 g.
Descending: 4.678 > 4.666 > 4.656 > 4.600 > 4.595

(d) All near 33.3 m.
Descending: 33.331 > 33.313 > 33.31 > 33.133 > 33.13

Answer: (a) 11.10, 11.01, 1.101, 1.011, 1.01 | (b) 2.768, 2.698, 2.675, 2.567, 2.499 | (c) 4.678, 4.666, 4.656, 4.600, 4.595 | (d) 33.331, 33.313, 33.31, 33.133, 33.13

Q5 Using the digits 1, 4, 0, 8, and 6 make: (a) the decimal number closest to 30, (b) the smallest possible decimal number between 100 and 1000.

SOLUTION

(a) Closest to 30: We need a 2-digit integer part.
Since 3 is not available, the closest tens digit is 4 → 40.something.
To minimize distance from 30, minimize the number: 40.168
(Distance from 30 = 10.168, which is the smallest possible with these digits.)

(b) Smallest between 100 and 1000: Use 1 as hundreds digit (smallest available ≥ 1).
Hundreds = 1, then tens = 0, units = 4, then smallest decimals: .68
→ 104.68

Answer: (a) 40.168 | (b) 104.68

Q6 Will a decimal number with more digits be greater than a decimal number with fewer digits?

SOLUTION

No, not necessarily.

Example: 1.5 (1 decimal digit) vs 1.005 (3 decimal digits).

1.5 = 1.500 > 1.005 even though 1.005 has more digits after the decimal point.

The value depends on the place value of each digit, not the number of digits.

Answer: No. For example, 1.5 > 1.005 even though 1.005 has more decimal digits.

Q7 Mahi purchases 0.25 kg of beans, 0.3 kg of carrots, 0.5 kg of potatoes, 0.2 kg of capsicums, and 0.05 kg of ginger. Calculate the total weight.

SOLUTION

Total = 0.25 + 0.30 + 0.50 + 0.20 + 0.05

= (0.25 + 0.05) + (0.30 + 0.20) + 0.50

= 0.30 + 0.50 + 0.50

= 1.30 kg

Answer: Total weight = 1.30 kg

Q8 Pinto supplies 3.79 L, 4.2 L, and 4.25 L of milk in the first three days. In 6 days, he supplies 25 litres. Find the total quantity supplied in the last three days.

SOLUTION

Milk in first 3 days = 3.79 + 4.20 + 4.25

= 3.79 + 4.20 = 7.99

7.99 + 4.25 = 12.24 L

Milk in last 3 days = 25 − 12.24 = 12.76 L

Answer: Milk in last 3 days = 12.76 L

Q9 Tinku weighed 35.75 kg in January and 34.50 kg in February. Has he gained or lost weight? How much is the change?

SOLUTION

Change = 35.75 − 34.50 = 1.25 kg

Since February weight < January weight, Tinku has lost weight.
Change = 1.25 kg lost.

Answer: Tinku lost 1.25 kg

Q10 Extend the pattern: 5.5, 6.4, 6.39, 7.29, 7.28, 8.18, 8.17, ___, ___

SOLUTION

Differences between consecutive terms:
6.4 − 5.5 = +0.9
6.39 − 6.4 = −0.01
7.29 − 6.39 = +0.9
7.28 − 7.29 = −0.01
8.18 − 7.28 = +0.9
8.17 − 8.18 = −0.01

Pattern: alternately add 0.9, then subtract 0.01.
Next term: 8.17 + 0.9 = 9.07
Then: 9.07 − 0.01 = 9.06

Answer: 9.07, 9.06

Q11 How many millimeters make 1 kilometer?

SOLUTION

1 km = 1000 m
1 m = 100 cm
1 cm = 10 mm

1 km = 1000 × 100 × 10 mm = 10,00,000 mm

Answer: 1 km = 10,00,000 mm (ten lakh millimetres)

Q12 Indian Railways offers optional travel insurance at 45 paise per passenger. If 1 lakh people opt for insurance in a day, what is the total insurance fee paid?

SOLUTION

Fee per passenger = 45 paise = 0.45
Number of passengers = 1 lakh = 1,00,000

Total fee = 1,00,000 × 0.45
= 1,00,000 × 45/100 rupees
= 1,00,000 × 45 ÷ 100
= 45,00,000 ÷ 100
= 45,000

Answer: Total insurance fee = 45,000

Q13 Which is greater? (a) 10/1000 or 1/10, (b) one-hundredth or 90 thousandths, (c) one-thousandth or 90 hundredths.

SOLUTION

(a) 10/1000 = 1/100 = 0.01; 1/10 = 0.1.
0.1 > 0.01, so 1/10 is greater.

(b) One-hundredth = 1/100 = 0.01; 90 thousandths = 90/1000 = 0.09.
0.09 > 0.01, so 90 thousandths is greater.

(c) One-thousandth = 1/1000 = 0.001; 90 hundredths = 90/100 = 0.9.
0.9 > 0.001, so 90 hundredths is greater.

Answer: (a) 1/10 is greater | (b) 90 thousandths is greater | (c) 90 hundredths is greater

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Q14 Write the decimal forms of the quantities mentioned (example given: 87 ones, 5 tenths and 60 hundredths = 88.10): (b) 12 tens and 12 tenths, (c) 10 tens, 10 ones, 10 tenths, and 10 hundredths, (d) 25 tens, 25 ones, 25 tenths, and 25 hundredths.

SOLUTION

(b) 12 tens + 12 tenths = 120 + 12/10 = 120 + 1.2 = 121.2

(c) 10 tens + 10 ones + 10 tenths + 10 hundredths
= 100 + 10 + 10/10 + 10/100

= 100 + 10 + 1 + 0.10
= 111.10

(d) 25 tens + 25 ones + 25 tenths + 25 hundredths
= 250 + 25 + 25/10 + 25/100
= 250 + 25 + 2.5 + 0.25
= 277.75

Answer: (b) 121.2 | (c) 111.10 | (d) 277.75

Q15 Write the following fractions in decimal form: (a) 1/2, (b) 3/2, (c) 1/4, (d) 3/4, (e) 1/5, (f) 4/5.

SOLUTION

(a) 1/2 = 5/10 = 0.5

(b) 3/2 = 15/10 = 1.5

(c) 1/4 = 25/100 = 0.25

(d) 3/4 = 75/100 = 0.75

(e) 1/5 = 2/10 = 0.2

(f) 4/5 = 8/10 = 0.8

Answer: (a) 0.5 | (b) 1.5 | (c) 0.25 | (d) 0.75 | (e) 0.2 | (f) 0.8