(i) Use Numbers in Practical Situations

1. The lowest temperature recorded at Scott Base in Antarctica is -57.0°C. The highest temperature recorded at Scott Base is 63.8°C more than this. What is the highest temperature recorded at Scott Base? [1]
2. The temperature at 0700 is -3°C. This temperature is 11°C higher than the temperature at 0100. Find the temperature at 0100. [1]
3. Write down the temperature that is 7 °C below -3 °C. [1]
4. One day in Chamonix the temperature at noon was 6°C. At midnight the temperature was 11°C lower. Write down the temperature at midnight. [1]
5. At noon the temperature was 4°C. At midnight the temperature was –5.5 °C.
   Work out the difference in temperature between noon and midnight [1]
6. Giulio's reaction times are measured in two games. In the first game his reaction time is 1/3 of a second. In the second game his reaction time is 1/8 of a second. Find the difference between the two reaction times. [1]
7. Write down the difference in temperature between 8°C and −9°C [1]
8. In Vienna, the mid-day temperatures, in °C, are recorded during a week in December.
   This information is shown below. –2 2 1 –3 –1 –2 0
   Calculate the difference between the highest temperature and the lowest temperature, [1]
9. During one week in April, in Quebec, the daily minimum temperatures were
   –5°C, –1°C, 3°C, 2°C, –2°C, 0°C, 6°C.
   Write down (a) the lowest of these temperatures, [1] (b) the range of these temperatures.
10. On a mountain, the temperature decreases by 6.5 °C for every 1000 metres increase in height.
    At 2000 metres the temperature is 10 °C. Find the temperature at 6000 metres [2]

Answers

1) 6.8 2) -14 3) -10 4) -5 5) 9.5 6) 5/24 7) 17° 8) 5 9)(a) ±5 (b) 11 10)-16

(ii) Evaluate Fractions

1. Write 11/3 as a mixed number [1]
2. Work out $\frac{12}{35} \times \frac{7}{9}$

   You must show all your working and give your answer as a fraction in its simplest form [2]
3. Workout $3\frac{1}{8} \div \frac{5}{12}$

   You must show all your working and give your answer as a mixed number in its simplest form [4]
4. Workout $\frac{5}{6} + \frac{2}{3}$

   You must show all your working and give your answer as a mixed number in its simplest form. [3]
5. Work out $2\frac{2}{3} + 3\frac{1}{2}$.

   Give your answer as a mixed number in its simplest form. [3]
6. Work out $3\frac{5}{8} - 1\frac{2}{3}$

   You must show all your working and give your answer as a mixed number in its simplest form. [3]
7. Work out $\frac{2}{3} + \frac{1}{4} \times \frac{2}{3}$

   Write down all the steps of your working and give your answer as a fraction in its simplest form.[3]
8. Jiwan incorrectly wrote $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} = 1\frac{3}{9}$

   Show the correct working and write down the answer as a mixed number [3]

Answers

1. $3\frac{2}{3}$ 2. $\frac{4}{15}$ 3. $7\frac{1}{2}$ 4. $1\frac{1}{2}$ 5. $6\frac{1}{6}$ 6. $1\frac{23}{24}$ 7. $\frac{5}{6}$ 8. $2\frac{1}{12}$

(iii) Decimal Evaluations

Workout the following

1. Express 0.4 as fraction in its simplest form
2. Express 0.03 as a fraction
3. 0.3^2.[1]
4. $(0.01)^2$. [1]
5. 0.3 x 0.2 [1]
6. 0.2 x 0.45 [1]
7. 0.1 x 0.06 [1]
8. 0.4 x 0.02 [1]
9. 0.4 x 0.06 [1]
10. 0.105 x 0.2 [1]
11. 0.9 x 0.02 [1]
12. 1.7 x 0.03 [1]
13. 0.4 x 3 [1]
14. 27 x 0.002 [1]
15. 25 – 18.3
16. 10 – 0.56
17. 1.5 – 0.2 x 4
18. 0.4 + 0.3 x 5
19. 6.3 ÷ 0.9
20. 4.2 ÷ 0.07
21. 6.3 ÷ 0.09
22. 56 ÷ 0.08
23. Express 1/1.25 as decimal
24. Express 7/100 as decimal
25. Express 13/20 as decimal
26. Write 13/40 as decimal

Answers 1)$\frac{2}{5}$ 2)$\frac{3}{100}$ 3) 0.09 4) 0.0001 5) 0.06 6) 0.09 7) 0.006 8) 0.008 9) 0.024 10) 0.021 11) 0.018 12) 0.051 13) 1.2 14) 0.054 15)6.7 16)9.44 17)0.7 18)1.9 19)7 20)60 21)70 22)700 23)0.8 24)0.07 25)0.65 26)0.325

(iv) Arranging quantities by magnitude

1. Write down the following numbers in order of size, starting with the smallest
   -0.29 , -1.5, 0, -0.3,-4 Answer : _____ [1]
2. Three Numbers are given, 0.7 million ____ , 687000 ____, eight hundred and four thousand ____
   Write L against the largest, M against the next largest and S against the smallest number. [1]
3. Write down the following numbers in order of size, starting with the smallest
   $0.7,\ 0.7^2,\ 7/11,\ 7/9$ Answer : _____ [1]
4. Write down the following numbers in order of size, starting with the smallest
   3, 1/3, -1, 1 Answer : _____ [1]
5. Write down the following numbers in order of size, starting with the smallest
   9/20, 0.39, 46%, 2/5 Answer : _____ [1]
6. Arrange these values in order of size, starting with the smallest.
   0.38 9/25 0.4 7/20 Answer : _____ [1]
7. Arrange these values in order of size, starting with the smallest.
   22% 9/2 0.2 Answer : _____ [1]
8. Write the following numbers in order of size, starting with the smallest.
   0.67 7/9 2/3 66 % Answer : _____ [1]
9. Write the following times in order of size, starting with the smallest.
   6500 seconds 110 minutes $1\frac{3}{4}$ hours Answer : _____ [1]
10. Arrange the following in order, starting with the smallest
    74% -0.7 $0.\dot{7}$ -3/4 Answer : _____ [1]

Answers

1)-4, -1.5,-0.3,-0.29, 0 2)M,S,L 3)0.7^2,7/11, 0.7, 7/9 4)-1,1/3,1,3 5) 0.39, 2/5 , 9/20, 46%, 6)7/20, 9/25,0.38,0.4 7)0.2, 22% , 9/2 8) 66 %, 2/3,0.67,7/9 9) $1\frac{3}{4}$ hours, 6500 sec, 110min

10) -3/4, -0.7, 74%, $0.\dot{7}$

(v) Recurring decimals to fractions

Write the recurring decimals as a fraction. Show all your working and give your answer in its simplest form.

1. $0.\dot{2}\dot{3}$ [1] 2. $0.4\dot{7}$ [2] 3. $0.\dot{7}$ [1] 4. $0.6\dot{7}$ [2] 5. $0.\dot{8}$ [1] 6. $0.\dot{6}\dot{3}$ [3] 7. $0.1\dot{8}$ [2] 8. $0.1\dot{7}$ [2]
9. $0.\dot{4}\dot{8}$ [2] 10. $0.8\dot{7}$[2] 11. $0.\dot{4}$ [2] 12. $0.3\dot{6}$ [3] 13. $0.3\dot{2}$ [2] 14. $0.\dot{1}\dot{8}$ [2] 15. $0.2\dot{5}$[2] 16. $0.\overline{123}$

Answers

1) 23/99 2) 43/90 3) 7/9 4) 61/90 5) 8/9 6) 7/11 7) 17/90 8) 8/45 9) 16/33 10) 79/90
11) 4/9 12) 11/30 13) 29/90 14)2/11 15) 23/90 16)$\frac{41}{333}$

(vi) Types of Numbers

- **Natural Numbers** : [1,2,3,4.....]
  Occur commonly in nature (non –ve , doesn't include zero and non decimal numbers)
- **Whole Numbers** : [0,1,2,3,4,.....]
  All natural numbers + 0 (non –ve and non decimal values)
- **Integers** : [.....-3,-2,-1,0,1,2,3.....]
  Whole numbers and their opposite negative numbers (non decimal numbers)
- **Rational Numbers** :
  Numbers that can be written as fraction p/q, where p and q are Integers
  These contain all
  a)Integers [eg 5 (=5/1)] _____
  b) Fractions [eg 2/7] _____
  c) Small terminating (ending) decimal numbers [eg 0.2 (=2/10)] _____
  d) Square root of complete square numbers [eg $\sqrt{16}$ (=4/1)] _____
  e) Cube root of complete cube numbers [eg $\sqrt[3]{8}$ (=2/1] _____
  f) Recurring (repeating) decimal number [eg $0.\dot{3}$ (=1/3)]_____
- **Irrational Numbers** :
  (Numbers that cannot be written as fraction p/q, where p and q are Integers)
  These contain all
  a) Never ending decimal numbers with numbers with no recurring (repeating)pattern
  (eg π , 2π)
  b) Square root of non complete square numbers
  (eg $\sqrt{5}$, $\sqrt{17}$)
  c) Cube root of non complete cube numbers ($\sqrt[3]{7}$, $\sqrt[3]{10}$)
- **Even Numbers** : all numbers completely divisible by 2
  [0,2,4,6,8,10.....]
- **Odd numbers**: all numbers not completely divisible by 2
  [1,3,5,7,9,11.....]
- **Prime Numbers** : numbers that are only completely divisible by only **two** numbers, 1 and itself
  [2,3,5,7,11,13,17.....]
- **Composite Numbers :** Numbers that are completely devisable by more than two numbers
  [4,6,8,9,10,12.....]
  Note : 1 is neither Prime nor Composite
- **Real Numbers**: All numbers on the number line (+ve,-ve, decimal, fractions)
- **Square Numbers**: The product of a number multiplied by itself
  [1,4,9,16,25,36,49.....]
- **Cube Numbers**: The product of a number multiplied by itself three times
  [1,8,27,64.....]

1. 27 28 29 30 31 32 33
   From the list of numbers, write down
   (a) a multiple of 7, [1] (b) a cube number, [1] (c) a prime number. [1]
2. Here is a list of numbers.
   21 2/3 $\sqrt{13}$ 31 $\sqrt{121}$ 51 0.7
   From this list, write down
   (a) a prime number, [1] (b) an irrational number. [1]
3. Here is a list of numbers.
   87 77 57 47 27
   From this list, write down
   (a) a cube number, [1] (b) a prime number. [1]
4. Write down a prime number between 20 and 30. [1]
5. 22 17 25 41 39 4
   Work out the difference between the two prime numbers in the list above.[2]
6. From this list of numbers, write down
   $\sqrt{5}$ -7 343 -11 0.4 2.5 1/3
   (a) a cube number, [1] (b) the smallest number, [1] (c) a natural number. [1]
7. 8 9 10 11 12 13 14 15 16
   From the list of numbers, write down
   (a) the square numbers, [1] (b) a prime factor of 99. [1]
8. 11 12 13 14 15 16
   From the list of numbers, write down
   (a) the factors of 60, [1] (b) the prime numbers. [1]
9. 3.56 5 $\sqrt{196}$ 8 $\sqrt{7}$ 12
   From the list, write down a number that is
   (a) a multiple of 3, [1] (b) a cube number, [1] (c) a prime number, [1] (d) an irrational number. [1]
10. 32 33 34 35 36 37 38 39
    From this list of numbers, write down
    (a) a multiple of 8, [1]
    (b) a square number, [1]
    (c) a prime number [1]
11. The sum of the prime numbers less than 8 is equal to 17.
    (a) Find the sum of the prime numbers less than 21. [2]
    (b) The sum of the prime numbers less than x is 58.
    Find an integer value for x. [2]
12. Which of the following numbers are irrational? [2]
    2/3, $\sqrt{36}$, $\sqrt{3}+\sqrt{6}$, π, 0.75, 48%, $8^{\frac{1}{3}}$, $0.\dot{2}\dot{3}$
13. 210 211 212 213 214 215 216
    From the list of numbers, find
    (a) a prime number,[1] (b) a cube number [1]
14. p is the largest prime number between 50 and 100.

q is the smallest prime number between 50 and 100.

Calculate the value of p – q. [2]

15. Write down the next two prime numbers after 31. [2]
16. Write down the cube number that is greater than 50 but less than 100. [1]
17. (a) Complete these statements. The reciprocal of 0.2 is .....

    A prime number between 90 and 100 is ..... [2]

    (b) $\frac{7}{5}$ 0.6 $\sqrt{7}$ 8 $\sqrt{9}$ From this list, write down an irrational number. [1]
18. P is a prime number where $60 < P < 80$. P is 2 less than a square number. Find the value of P [2]

Answers

1) (a)28 (b)27 (c)29 , 31 2) (a) 31 or $\sqrt{121}$ (b) $\sqrt{13}$ 3) (a) 27 (b)47 4) 23 or 29 5) 24 (from 41 - 17) 6) (a)343 (b)-11 (c)343 7) (a)9 or16 (b)11 8) (a) 12 & 15 (b)11 & 13 9) (a) 12 (b) 8 (c)5 (d) $\sqrt{7}$ 10) (a)32 (b)36 (c)37 11)(a)77 (b) 18 or 19 12) $\sqrt{3}$ + $\sqrt{6}$, & π 13) (a)211 (b)216 14) 97-53 = 44 15) 37 & 41 16) 64 17)(a)5,97 (b) $\sqrt{7}$ 18) 79