Question bank

Chapter-1 Term 1 Number systems

Q-1 **Write down the base of each number.**

a) 5■

b) 15

c) 11■

d) 17■

e) 28■

f) 49■■

g) 14

h) 11■

i) 46■

j) 89

k) 211■

l) 3 122■

m) 434■

n) 3 006■

o) 625■

Q-2 **Expand the numbers in their respective bases.**

a) 11■

b) 211■

c) 3 122■

d) 51 361■

e) 1 111■

Q-3 **Write down the value of the digit 5 in these numbers.**

a) 105■

b) 512■

c) 125

d) 1 520

Q-4 **Write 3 245■ in the base 6 place value system. Explain the meaning of each digit.**

Q-5 **Write 51 362■ in the base 7 place value system. Explain the meaning of each digit.**

Q-6 **Change these numbers to base 8 numbers.**

a) 66
b) 54
c) 77
d) 778
e) 999

Q-7 **Change each number to a base 6 number.**

a) 67
b) 55
c) 78
d) 779
e) 1000

Q-8 **Change each number to a base 5 number.**

a) 68
b) 56
c) 79
d) 780
e) 1001

Q-9 **Change each number to a base 7 number.**

a) 69
b) 57
c) 80
d) 781
e) 1002

Q-10 **Convert the following binary numbers to base 10 numbers.**

a) 111
b) 110101
c) 1100001
d) 1001011
e) 11000
f) 11110
g) 1110

h) 100001

Q-11 **Convert the following base 10 numbers to binary numbers.**

a) 710

b) 1910

c) 5810

d) 12310

e) 19510

f) 10410

g) 9110

Q-12 **Convert the following numbers to base 2 numbers.**

a) 112■

b) 131■

c) 1566■

d) 22■

e) 102■

f) 64■

Q-13 **Convert 10101010■, first to a decimal number and then to a number in base 3.**

Q-14 **A certain binary number has three digits.**

a) What is the smallest and the largest numbers possible?

b) Convert these numbers to base 10.

Q-15 **Calculate the difference between the base 10 number 11111 and the binary number 11111 and give your answer in base 10.**

Q-16 **"Flip a coin" Prediction for most frequent outcome: Heads/Tails**

Q-17 **"Roll 1 die" Prediction for most frequent outcome: 1 2 3 4 5 6**

Q-18 **"Pick a card colour" Prediction for most frequent outcome: Red/Black**

Q-19 **"Pick a card suit" Prediction for most frequent outcome: Clubs (♣)/Spades (♠)/Diamonds (♦)/Hearts (♥)**

Q-20 **"Pick an exact card"**

Q-21 **In which game of chance were your predictions most accurate?**

Q-22 **Complete the table below, writing down the probability for each event. Use the results from your experiments in Questions 1 to 5 to calculate the experimental probabilities.**

Q-23 **Compare the theoretical and experimental probabilities for each game of chance. Were the theoretical and experimental probabilities in your experiments close to each other?**

Q-24 **Consider the spinner below.**

a) What is the probability of choosing an odd number?

b) What is the probability of choosing an even number?

c) What is the probability of choosing a prime number?

d) What is the probability of choosing 1 or 5?

e) What is the probability of choosing 3 or 4?

Q-25 **There are 5 white balls, 8 red balls, 7 yellow balls and 4 green balls in a container. A ball is chosen at random. Give all your answers as a fraction, a decimal and a percentage.**

a) What is the probability of choosing red?

b) What is the probability of choosing green?

c) What is the probability of choosing either red or white?

d) What is the probability of choosing neither white nor green?

e) What is the probability of choosing other than yellow?

f) What is the probability of choosing black?

Q-26 **Identify more likely, less likely, equally likely, sure and impossible events.**

a) Selecting of a white ball from a box with 5 white balls, 8 red balls and 10 yellow balls.

b) Selecting of a black card from a deck of cards.

c) The chance of getting an even number when a die is rolled.

d) Selecting of a red marble from a box with 12 white marbles.

e) Selecting of a red marble from a box with 12 white balls.

f) Selecting a boy for a field trip from a group of 35 students, of which 12 are girls.

Q-27 **A month is chosen from a year.**

a) Find the probability of selecting a month with 31 days.

b) Find the probability of selecting a month ending with the letter Y.

c) Find the probability of selecting a month ending with the letter R.

d) Find the probability of choosing a month either starting with the letter J or ending with the letter Y.

e) Find the probability of selecting a month that starts with the letter J and ends with the letter Y.

Q-28 **A die, numbered 1 to 6, is rolled once. What is the probability that a 5 is gotten?**

Q-29 **A wardrobe contains 3 blue shirts and 4 white shirts. A shirt is selected at random from the wardrobe. Find the probability that a white shirt is selected.**

Q-30 **A box has 6 packets of chewing gum. A packet is selected at random from the box. Find the probability that it is a chocolate.**

Q-31 **The probability of an event happening is: Find the probability of the event failing to happen in each case.**

a) 3/4

b) 7/8

c) 12/17

d) 4/31

e) 17/19

Q-32 **A bag contains 11 green balls and 14 yellow balls. A ball is selected at random from the bag. Find the probability that it is:**

a) green

b) yellow

Q-33 **Mayowa has a bag containing 10 oranges and 7 apples. He selects a fruit at random from the bag. What is the chance of it being an apple?**

Q-34 **A number is selected at random from the set (1, 2, 3, 4, 5, 6, 7, 8, 9, 10). Find the probability that it is:**

a) odd

b) even

Q-35 **From the set of numbers 1 to 20, a number is selected. Find the probability that it is:**

a) odd

b) even

Q-36 **A letter is selected at random from the English alphabet. Find the probability that it is:**

a) a vowel

b) a consonant.

Chapter-2 Term 1 Basic operations in the binary system

Q-1 **Add or subtract the given binary numbers.**

a) 10111 – 10011

b) 10111 – 01000

c) 11111 – 01000

d) 11000 – 11111

e) 11111 + 10100

f) 10100 + 01010

Q-2 **Find x in each of the following, where x is a binary number.**

a) x + 111 = 11110

b) x + 11110 = 10001

c) x – 10 = 101

d) x + 11 = 1101

Q-3 **Given the binary numbers 11101■ and 1110■.**

a) Convert the two binary numbers to base 10.

b) Add the two base 10 numbers in the result above together.

c) Add the two binary numbers together.

Q-4 **Multiply the following binary numbers.**

a) 1100 × 10

b) 11111 × 10

c) 1101 × 11

d) 10011 × 101

e) 101101 × 111

f) 10101 × 10001

Q-5 **Divide the following binary numbers.**

a) 101110 ÷ 100

b) 100110 ÷ 101

c) 10100 ÷ 10

d) 1100 ÷ 100

Q-6 **Multiply 23 by 35.**

a) Convert your answer to a binary number.

b) Convert 23 and 35 to binary numbers.

Q-7 **Copy and complete the table on the right for addition in base 3.**

Q-8 **Copy and complete the table on the right for addition in base 4.**

Q-9 **Construct a table for addition in:**

a) base 6

b) base 8

c) base 9

Q-10 **Calculate the following in base 3.**

a) 21■ – 12■

b) 11■ + 12■

c) 10■ + 11■

d) 102■ – 101■

Q-11 **Calculate the following in base 4.**

a) 13■ + 22■

b) 33■ – 22■

c) 123■ + 311■

d) 132■ + 213■

Q-12 **Calculate the following in base 8.**

a) 76■ + 54■

b) 474■ + 255■

c) 2404■ + 375■

d) 5766■ + 4676■

Chapter-3 Term 1 Application of number systems

Q-1 **Your mother decides to reward you for doing your chores. To keep record of the days on which you do your chores she gives you a punch card. On days you do your chores, she punches a heart. On the day you do not do your chores, she punches a hole.**

a) If a ♥ represents 1 and a hole represents 0, write the punches on your card in binary code.

b) Convert the number to base 10.

c) Write FRIDAY in binary code.

d) After you have filled in 10 punch cards, your mom wants to see on which days you do your chores most often. Explain to her how to do this.

Q-2 **You and your friend write letters to each other in secret code using the binary system. You receive a note from him with the following code. Decipher the code.**

Q-3 **You write back to your friend to tell him you will be late. Write I WILL BE LATE in binary code.**

Q-4 **The computer screen below shows a message in binary code. Write the message.**

Q-5 **This punch tape with eight slots shows Zaki's year of birth. Write down what it is.**

Q-6 **On a punch card, write your own year of birth, in binary numbers.**

Chapter-4 Term 1 Rational and non-rational numbers

Q-1 **List ten elements of each of these sets of numbers:**

a) ■

b) ■

c) ■

d) ■

Q-2 **State whether the following is true or false:**

a) $4 \in$ ■

b) $\sqrt{3} \in$ ■

c) $5 \in$ ■

d) $\pi \in$ ■

e) $3/5 \in$ ■

f) $-1/2 \in \blacksquare$

Q-3 **Given the set {–9, –4.7, –√–3, –2/5, 0, 7/3, 3.666, 9}, list the members that belong to these sets:**

a) whole numbers

b) natural numbers

c) rational numbers

d) irrational numbers

e) integers

f) negative integers

Q-4 **Convert these fractions to decimal numbers.**

a) 2/5

b) 5/12

c) 2/7

d) 4/9

e) 1 3/5

f) 3 21/100

Q-5 **Convert these decimal numbers to fractions.**

a) 0.4

b) 0.52

c) 0.37

d) 3.21

e) 0.009

f) 3.06

Q-6 **Write each recurring decimal in the form a/b; a, b $\in \blacksquare$.**

a) 0.121212…

b) 0.55555…

c) 5.656565…

d) 0.3 …

e) 2.18 …

f) 1.123123…

Q-7 **Find the following roots by trial and improvement.**

a) √50

b) √74

c) √18

d) $\sqrt[3]{49}$

Q-8 **Construct each of the following irrational numbers on a number line.**

a) $\sqrt{45}$

b) $\sqrt{13}$

c) $\sqrt{136}$

Q-9 **Adamma did research for a Mathematics project. She measured the circumference and diameter of various circular objects. The following table shows her results. One of the items was measured very inaccurately. From the table below, which item was measured the most inaccurately? Explain why you chose your answer.**

Chapter-5 Term 1 Word problems

Q-1 **A boy has collected 1 638 stamps. If he is given a further 1 429 stamps, how many does he have altogether?**

Q-2 **Femi is 15 years older than Tayo, and Tayo is 10 years older than Onyemachi. If Onyemachi is 18 years old, what is their total age?**

Q-3 **A library had 2 596 books. How many more did it buy to have a total of 4 220 books?**

Q-4 **The temperature of a room dropped from 24 °C to –10 °C. What is the total drop in temperature?**

Q-5 **A farmer sold 58 baskets of tomatoes in a day. If each basket weighed 13 kg, what was the total weight of the tomatoes he sold in a day?**

Q-6 **3 000 ■ of kerosene were sold in equal quantities to 40 retailers. What quantity did each retailer receive?**

Q-7 **Ayanti had ■24 to spend on seven pencils. After buying them, she had ■10 left over. How much did each pencil cost?**

Q-8 **You bought a magazine for ■5, as well as four erasers. You spent a total of ■25. How much did each eraser cost?**

Q-9 **Adankwo earns ■1 500 per hour. If she works six hours a day for ten days, how much will she be paid?**

Q-10 **Last week, Daraja ran 30 km more than Chinyere. If Daraja ran 47 km, how many km did Chinyere run?**

Q-11 **At a restaurant, Edidiong and his three friends decided to divide the bill evenly. If each person paid ■13, what was the total bill?**

Q-12 **After paying ■990 for a lunch, Ingebedion has ■5 500 left. How much money did he have before buying lunch?**

Q-13 **Tunde baked some cookies for her grandmother. She baked a dozen chocolate chip cookies, two dozen oatmeal cookies, and nine sugar cookies. How many cookies did she bake?**

Q-14 **Iyawa bought two blouses at ■7 150 each, four skirts for ■8 300, and a pair of shoes for ■13 000. What was the total cost of her shopping trip?**

Q-15 **Make an equation for each of the following word problems. You do not need to solve the equation.**

a) I think of a number, and then I double it. I get an answer of 12.

b) I think of a number, treble it, add 5 and get 12.

c) The three angles of a triangle are x, 2x and x + 1. What is the size of each angle?

d) The three sides of a triangle are x, x + 1 and x – 1. The perimeter is 20 cm.

e) The four sides of a quadrilateral are x, x + 1, 2x and x + 1. The perimeter is 100 cm.

f) I have x naira and my friend has double that amount. Between us, we have ■3 000.

g) I have x naira and my friend has ■200 more than that. Between us, we have ■7 000.

h) Oranges cost ■30 each. A number, n, of oranges is bought at a total cost of ■690.

i) I think of a number, double it, add 4 and get five times my starting number.

j) I think of a number, multiply by 5, subtract 4 and get three times my starting number.

k) If you add 6 to this number, you get the same answer as multiplying it by 4.

l) I think of a number, subtract 4, then double it and get 40.

m) If you multiply this number by 10, you get the same answer as adding 60 to it.

Q-16 **Solve the following word problems by setting up an equation.**

a) If five is added to three times a certain number, the result is 17. What is the number?

b) When four is added to a certain number and the result is doubled, the answer is 14. What is the number?

c) When five is added to a certain number, the answer is the same as subtracting one from the number and multiplying the result by 4. Find the number.

d) A rectangle has length (x + 7) cm and width (x + 1) cm. Given that the perimeter of the rectangle is 28 cm, find the length and width of this rectangle

e) Imbiana spent 90 minutes doing her homework. She spent t minutes doing Mathematics, 2t minutes doing Physics and the remaining (t + 14) minutes studying Chemistry. How many minutes did she spend doing Mathematics?

f) A woman at the market was selling oranges and grapefruit. Each orange cost ■40 and each grapefruit cost ■100. She had twice as many oranges as grapefruit. She sold all the fruit and received ■3 600. How many grapefruit did she have?

Q-17 **Without solving any of the equations, write word problems for each equation.**

a) $x + 3 = 8$

b) $155 – 35 = s + 21$

c) $3y + 16 = 6v – 2$

d) $6u – 60 = 3u – 15$

e) $x/5 = 30$

f) $y/4 = 12$

Q-18 **Adoma has 4 ■ of water in her water bottle. She gives 1½ ■ to her friend Anuli. How much water is left in her bottle?**

Q-19 **Three■fifths of the students of a class are girls, and there are 36 girls in the class. How many students are there in this class?**

Q-20 **The sum of ■2 800 is to be shared among three students – Ekong, Isoken and Hassana. Ekong has 2/8 of the money, Isoken takes 3/7 of it and the rest goes to Hassana. How much does Hassana get?**

Q-21 **A school has 1 000 students and 600 of them are boys. What fraction of the student population is girls?**

Q-22 **At the beginning of the week, Abomeli is given ■5 000 as his allowance. He uses 5/2 of this as taxi fare to school for the week and 1/4 of this amount for all his lunch breaks.**

a) How much money does he use for the week's expenses?

b) What fraction of the money does he have left at the end of the week?

c) He wants to buy a book that costs ■9 000. How many weeks will it take him to save enough money for the book?

Q-23 **How many fifths are there in 200?**

Q-24 **The product of 9/5 and a number is 63. Find the number.**

Q-25 **Six■sevenths of a number is 36. Find the number.**

Q-26 **How many times can 1/4 be subtracted from 2?**

Q-27 **2/5 of a class of 45 are boys. Find the number of girls in the class.**

Q-28 **Aigbekaen drank orange juice from a 500 ml bottle. He found that 2/5 remained. How much did he drink?**

Q-29 **Emem and two of his friends ate one■fourth each of an eight■slice pizza. What fraction of the pizza remains?**

Q-30 **Out of a class of 150, one■third of the students opted to learn German, two■fifths chose Italian and the rest chose French. Find how many students wanted to learn French.**

Q-31 **Fifty divided by one■half minus forty. What is the answer?**

Q-32 **Ninety■five divided by one■fifth plus thirty■five. What is the answer?**

Q-33 **Nike spends 1/4 of her pocket money on chocolates and 1/8 on pizza. At the end she had ■2 000 left. How much did she have at the beginning?**

Q-34 **At 10:00 during the school day, Shalewa calculates that he has 1½ hours of Mathematics, 3/4 of an hour English and 1/2 hour of Geography left. At what time will the bell ring for the end of the day?**

Q-35 **Eniola has a cake recipe that requires 3/4 kg of flour, 1 kg of nuts, 1½ kg of sugar and 1/2 kg of butter for each cake.**

a) How much flour will she need for two cakes?

b) How much flour, nuts and sugar will she need for five cakes?

c) How much of each ingredient will she need for seven cakes?

Chapter-6 Term 1 Simplify expressions involving brackets and fractions

Q-1 **Simplify by removing the brackets.**

a) $3(a - 4b)$

b) $x(6y + x)$

c) $v(s + u)$

d) $a(5b + c)$

e) $v(5u + v^2)$

f) $y^2(6y + 7x)$

Q-2 **Remove the brackets first to simplify the following.**

a) $12 + 2(5a + 4)$

b) $3(a + 4b) + 5(2a + 3b)$

c) $5(3y + 4) + 3(y - 4)$

d) $8(u + 3v) - 4v$

e) $15 - 7(1 - x)$

f) $15 - 7(1 - x)$

Q-3 **Simplify the following.**

a) $2 \times (x + y)/3$

b) $2/3 \times (x + y)$

c) $3 \times (x + 4)/7$

d) $1/7 \times 3(x + 4)$

e) $3/7 \times (x + 4)$

f) $x/4 + x/7$

Chapter-7 Term 1 Factorisation

Q-1 **Multiply and simplify.**

a) $3(4x - 2x) - (3x - 2x)$

b) $(a - 1)(a - 2)(a - 3)$

c) $8(b - 2)(b - 3)$

d) $6 - (c - 2)(c - 3)$

e) $x(x + 1) - (x + 1)(x + 2)$

f) $3(a + 2)^2 - (a + 2)(a - 2)$

Q-2 **Find the HCF of the following expressions.**

a) x^2, $-x$■

b) t■, t■

c) $2x^2$, $12x$

d) 36x■, $18x^3$

e) u^2v, u^3v^2

f) x■y■, $-xy$

g) 9y■z■, –12y■z■

Q-3 **Factorise the following expressions:**

a) $x^2 - 5x$

b) $am - bm$

c) $9x - 12y$

d) $ay - y$

e) $3x^2 - 6$

f) $x^2 - bx^2$

g) $6xy + 9x$

h) $15g + 10hg^2$

Q-4 **Factorise.**

a) $7x^2 + 28x$

b) $6y^2 - 27y$

c) $x^3y + x^2y^2$

d) $3a^2b + 12ab^3$

e) $2ab + 4ab^2 + 6a^2b$

f) $xy + 2tx + x^2$

g) $12x^2y^3 + 18xy^3z$

h) ■$x^3 - 3x$

i) $3x - 9y$

j) $2x^2 + 4x^3y - 6x^2y^2$

Q-5 **Factorise the following expressions completely.**

a) $3(k + 1) – k(k + 1)$

b) $(m – 2) + p(m – 2)$

c) $2x(2b + a) – (a + 2b)$

d) $a(x + y) – b(y + x)$

e) $x(a – b) + y(b – a)$

f) $x^2(2a + b) – x(2a + b)$

Q-6 **Factorise the following expressions.**

a) $ap – 2aq + bp – 2bq$

b) $ay + az + by + bz$

c) $2ax + 2ay + bx + by$

d) $cx – dx + dy – cy$

e) $2ax – bx – 2a + b$

f) $a^2 – ab + ax – bx$

Q-7 **Factorise the following expressions.**

a) $x^2 – 9$

b) $x^2 – 16$

c) $y^2 – a^2$

d) $4 – 25b^2$

e) $50a^3 – 18ab^2$

f) $a^3 – ab^2$

g) a■ – 16

Q-8 **Without using a calculator, calculate:**

a) $121^2 – 120^2$

b) $57^2 – 56^2$

c) $31^2 – 29^2$

d) $145^2 – 135^2$

Q-9 **Expand and simplify.**

a) $(x + 1)(x + 2)$

b) $(x + 1)(x – 3)$

c) $(x + 8)(x – 1)$

d) $(x – 2)(x + 2)$

e) $(x + 2)(x + 7)$

f) $(x – 2)(x – 3)$

g) $(x - 5)(x + 3)$

Q-10 **Fill in the missing values for the following factor boxes.**

a) $x^2 + 3x + 2 =$ __

b) $x^2 + 10x + 24 =$ __

Q-11 **Factorise the following trinomials using the box method.**

a) $x^2 + 8x + 15$

b) $x^2 + 10x + 24$

c) $x^2 + 9x + 8$

d) $x^2 + 9x + 14$

e) $x^2 + 15x + 36$

f) $x^2 + 5x + 4$

Q-12 **Factorise.**

a) $x^2 + 5x + 6$

b) $x^2 - 8x + 15$

c) $x^2 - 5x + 6$

d) $x^2 + 5x - 14$

e) $x^2 + 3x - 10$

f) $x^2 + x - 12$

Q-13 **Factorise.**

a) $x^2 + 2x - 8$

b) $ax^2 + 5ax + 6a$

c) $x^2 + 18x + 17$

d) $x^3 - x^2 - 12x$

e) $x^2 - 7x - 18$

f) $-x^2 - 2x + 48$

Q-14 **Expand the following:**

a) $(x + 1)^2$

b) $(x - 3)^2$

c) $(x + 4)^2$

d) $(x - 5)^2$

e) $(x - y)^2$

f) $(3x - 2)^2$

Q-15 **Factorise.**

a) $x^2 - 2x + 1$

b) $x^2 - 6x + 9$

c) $x^2 - 18x + 81$

d) $x^2 - 12x + 36$

e) $x^2 - 10x + 25$

f) $x^2 + 24x + 144$

Q-16 **Explain how you would factorise each of the following expressions.**

a) $x^2 + 14x + 49$

b) $4x^2 - 36$

c) $2x^2 + 8x + 6$

d) $xy - 5y - 2x + 10$

e) $-7x^2 - 21x + 28$

f) $125a■ - 16b■$

Q-17 **Match the expressions (a) to (f) with the method you would use to factorise each expression.**

Q-18 **Factorise completely.**

a) $3x■y■ - 12x^3y■$

b) $x^3y - 4xy^3$

c) $2x^3 - 18x$

d) $(x - 1)^2 - 9$

e) $m■ - 256$

f) $(a - b)^3 + (b - a)$

g) $4x^2(x - 2) + 2x(x - 2)$

h) $3p^2 - 21p - 90$

i) $49m(x - y) + m^3(y - x)$

j) $3x(2x - 1) - 9(1 - 2x)$

k) $2x^2 - 2x - 12$

l) $5n^2 - 5n - 10$

Q-19 **The square of a number equals nine times that number. Find the number.**

Q-20 **The area of a square is numerically equal to five times its perimeter. Find the length of a side of the square.**

Q-21 **Forty-nine less than the square of a number equals zero. Find the number.**

Q-22 **The difference of the areas of two squares is 75 square metres. Each side of the larger square is twice the length of a side of the smaller square. Find the length of a side of each square.**

Q-23 **The money made from selling x chocolates at the school tuck shop over one month is given by $2x^3 - 2x$. Factorise the expression, and then determine the number of sweets, if x = 5.**

Q-24 **The diagram below shows two circles. The radius of the small circle is 1 cm and that of the large circle is 3 cm. Use factorising to find the area of the shaded part. Use the value of $\pi = 3.14$.**

Q-25 **The Olabiyi family had a square patch of lawn in their backyard. The lawn's original area was x^2 square metres. They increased the length and the breadth of the lawn. The area then became $x^2 + 8x + 15$ square metres. How much did they add to the length and breadth of the lawn?**

Q-26 **The length of the two sides of a right-angled triangle are given as 12 cm and 15 cm respectively. Use Pythagoras' theorem and the difference of squares to find the length of the missing side.**

Q-27 **The area of a rectangular chicken enclosure that a farmer wants to fence off is $x^2 - 8x + 15$. Find the dimensions of the enclosed area.**

Q-28 **The volume of a cylinder is given by $9x■ - 36$. Factorise the expression completely and calculate the volume of the cylinder, if x = 3.**

Q-29 **The volume of a swimming pool is given by $V = 180x - 58x^2 + 4x^3$. Factorise this expression.**

Q-30 **Determine the length of the sides of the square of which the area is $x^2 - 8x + 16$.**

Q-31 **A rectangular plot is 6 m longer than it is wide. The area of the plot is 16 m^2. Find the length and width of the plot.**

Q-32 **Find two consecutive even whole numbers whose product is 168.**

Chapter-8 Term 1 Changing the subject of a formula

Q-1 **Make the variable indicated for each formula the subject of the formula.**

a) $T = u(v - x)$; x

b) $D = \sqrt{(b^2 - 4ac)}$; c

c) $(a - x)/(a + x) = t$; x

d) $(ay + x)/x = 4 - y$; y

e) $\sqrt{((y + x)/(y - x))} = t$; x

f) $A = 2\pi r^2 + 2\pi rh$; h

g) $P = (1 - t^2)/(1 + t^2)$; t

h) $T = ua/(u + w)b$; u

i) $1/u + 1/v = 1/f$; u

j) $S = a(r^2 - 1)/t$; r

k) $V^2 = u^2 + 2as$; a

l) $T = x^2 + 5x$; x

m) $(m + 2n)/5 = (3m - 2n)/2$; m

n) $2x(4 - 3y) = 4(y + 7x)$; y

o) $(30 - u)/(4u) + w = 7/2$; u

Chapter-9 Term 1 Measures of central tendency

Q-1 **Which of these data are qualitative and which are quantitative? For each example of quantitative data, state whether the data are discrete or continuous.**

a) The number of passengers on a bus.

b) The temperature in Lagos at midday.

c) The number of oranges in a bag.

d) Different types of cars.

e) The ways in which students travel to school.

f) The number of goals scored in a football match.

g) Colours of the rainbow.

h) The number of colours in the rainbow.

Q-2 **Which of these data are qualitative or quantitative? For quantitative data, state whether the data are discrete or continuous.**

a) The different hair colours of 50 nurses.

b) The types of cars passing through a particular checkpoint.

c) The number of peas in a pod.

d) The number of newspapers sold at a particular kiosk.

e) The height of students in your class.

f) The mass (in g) of maize produced by each of 100 plants.

Q-3 **You want to investigate the internet safety for children. You decide to draw up a questionnaire to collect the data.**

a) Who would you ask to complete this questionnaire?

b) Design five questions for the questionnaire.

c) Below is an example of a question that was asked on a similar questionnaire on internet safety for children. How often are you bullied on the internet? Tick the relevant answer. Provide two reasons why this is not a good question for the survey, and give suggestions how the question can be improved.

Q-4 **Explain what the following means.**

a) population

b) sample

c) sampling bias

d) random sample

Q-5 **You want to conduct a survey to find out what movies people like to watch.**

a) How would you conduct sampling for this survey?

b) Design a suitable questionnaire to determine: i) how many movies they watch per month; ii) what movie genres people prefer.

Q-6 **Use tallies to record:**

a) the number of matchsticks per box

b) the number of students in the class and their shoe sizes

c) the number of students in the class, and their ages

Q-7 **Collect data on how each student travels to school.**

a) Count how many students travel by bicycle, bus, motorbike, motorcar or on foot.

b) Show your data in the form of a tally for each type of transport.

Q-8 **Twenty-four JSS3 students were asked how many counting sticks they had brought to school, and the following numbers were recorded:Draw a frequency distribution table for the data.**

Q-9 **A shoe dealer recorded the shoe sizes sold in one week as follows:**

a) Create a frequency distribution table for this information.

b) Which shoe size was most popular?

Q-10 **Here are some raw data that were collected to show the number of children in the families in a village.**

a) Copy and complete the table.

b) What does each frequency represent?

c) How many families have four children?

d) Which is the most frequently occurring number of children in a family?

e) How many families were questioned in this survey?

Q-11 **Find the mean of each of these data sets.**

a) 41, 26, 17, 64, 72, 65, 85, 20, 41, 26

b) 23, 27, 99, 75, 44, 17, 61, 27

c) 58, 87, 87, 49, 86, 10, 87, 55, 13, 63, 87

d) 88, 6, 69, 34, 6, 82, 81, 82, 70, 70, 70, 65, 69, 16

e) 43, 82, 70, 56, 69, 21, 87, 22, 87, 78, 22, 87, 82

f) 26, 89, 99, 100, 26

g) 99, 40, 26, 99, 58

Q-12 **Find the mode of each data set in Question 1.**

Q-13 **Find the median of each data set in Question 1.**

Q-14 **Find the mean, median and mode of these data sets.**

a) 24, 53, 38, 39, 51

b) 11, 9, 10, 9, 0, 9, 13

c) 72, 78, 63, 49, 81, 50, 56

d) $x + 3y$, $2x - y$, $7x + y$, $-2x$

Q-15 **During one school term, the sports teacher kept a record of the goals that members of the school's first eleven scored. The record stated: 1 boy scored 8 goals; 3 boys scored 4 goals each; 2 boys scored 3 goals each; 3 boys scored 2 goals each; 1 boy scored 1 goal; the goalkeeper did not save any goals. Find:**

a) the mean goal

b) the median goal

c) the modal goal

Q-16 **The marks obtained by students in a test are 4, 9, 3, x and 9. The median is 5, the mode is 4 and the mean is 6.5. Find the missing mark.**

Q-17 **Find the mean, the mode and the median of these data sets.**

a) 7, 4, 1, 3, 4, 9, 8, 11, 9, 9, 2

b) 127, 123, 125, 123, 124, 126

c) 1, 1, 2, 2, 2, 3, 3, 4, 5, 6, 6, 7, 8, 9

d) 70, 80, 90, 90, 100, 100, 120

Q-18 **A number of students were asked to estimate the height (in metres) of the school flagpole. The following results were recorded: 9, 10, 13, 8, 9, 12, 8, 10, 11, 12, 11, 14, 10, 10, 12, 12, 9, 12, 8, 9, 7, 11, 9, 11, 12.**

a) How many students took part in this exercise?

b) Find the mode, mean and median of the estimations.

c) What is the best estimate you can make for the height of the flagpole?

Q-19 **Construct a frequency table for the data set below, and find:**

a) the mean

b) the mode

c) the median

Q-20 **The table shows the salary, to the nearest thousand ■, earned by workers in a small dairy company.**

a) Calculate the mean frequency distribution of the data set.

b) Write a sentence explaining what your answer to Question 1(a) tells you about the salaries of the workers.

Q-21 **A meteorological service measured the rainfall (to the nearest cm) for each month for a period of one year. The results are shown in the table.**

a) Which was the wettest month in this year?

b) What was the average rainfall for this year?

Q-22 **A man kept count of the number of letters he received each day over a period of 60 days. The results are shown below. For this distribution, find:**

a) the mode

b) the median

c) the mean

Q-23 **Osarogie keeps chickens and records the number of eggs the chickens produce each day. The results for one month are shown in the table. Determine:**

a) the mean

b) the median

c) the mode

Q-24 **A store has the following jeans sizes in stock: (see table).**

a) Copy and complete the tally chart for the above data set.

b) Which average is the most suitable for the given data set – the mean, median or mode? Give a reason for your answer.

c) Find the following averages for the data: i) mean; ii) mode; iii) median.

Q-25 **Find the mean, median, mode and range of the following data sets:**

a) 5; 6; 6; 8; 8; 9; 11; 13; 14; 17

b) 0.85; 0.88; 0.89; 0.93; 0.94; 0.96

c) x | 2 | 4 | 3 | 5 | 6 | 5 | 7 ; f | 1 | 3 | 8 | 10 | 5 | 4 | 2

Q-26 **The heights, in centimetres, of the girls in a soccer team are: 175; 168; 175; 176; 173; 168; 169; 176; 169; 191; 176 cm. Find the mean, mode, median and range of the heights of the girls.**

Q-27 **Here is a list of the maximum temperatures for a week, in degrees Celsius: 16; 3; 15; 25; 20; 19; 19.**

a) Give the mean, median, mode and range of the temperatures.

b) If the person who read the temperatures discovered that they had made a mistake and the 3 degrees was meant to be 23 degrees, how would this affect your summary of the data?

Q-28 **Given the data set: 7; 7; 24; 5; 2.**

a) Find the mean, median, mode and range.

b) One number is added to the data set. What could that number be if: i) the mode remains the same ii) the median remains the same iii) the mean remains the same iv) the mean is increased by 2?

c) One number is removed from the data set. What could that number be if: i) the range and median remain unchanged ii) the mean is increased by 1?

Q-29 **In preparation for the 2018 Soccer World Cup, statisticians prepared a list of the highest scoring teams in Soccer World Cup history. Use the information to complete the table on the next page. Fill in the five scores that were considered, ranking them from highest (position 1) to lowest (position 5). • The lowest team score is 1 009 points. • The range is 1 003 points. • Spain have scored 1 77 more points than England, but 589 points less than Germany. • The mean number of points scored by the top five countries is 1 408.8.**

Chapter-10 Term 1 Representing data

Q-1 **The frequency table below contains data about how many oranges a woman sells at the market on each day of the week. Draw a pictogram using pictures of oranges to represent the data. Let 1 orange represent every 2 oranges sold.**

Q-2 **Use the table below to draw a pictogram. Do not forget to give your pictogram a title and a key. Choose a suitable symbol to represent bananas. Let one symbol represent six bananas.**

Q-3 **In a village census, the results below were recorded: • Number of children: 50 000 • Number of women: 40 000 • Number of men: 30 000 Draw a pictogram for the information, given that: ■ = 5 000 children ■ = 5 000 women ■ = 5 000 men**

Q-4 **Complete the table below, given ■ = 2 goals**

Q-5 **The table below shows the scores 60 students obtained in a Biology test. The test was marked out of 10.**

a) Draw a bar graph to show this information. Show the scores on the horizontal axis, and the frequency of scores on the vertical axis.

b) Repeat the process above, but this time make sure you leave no spaces between the bars.

Q-6 **The table below shows the number of students in each level in a certain college:Draw a bar chart to show this information.**

Q-7 **280 students were asked to name their favourite food. The results are given in the table below: Draw a bar chart to show this information.**

Q-8 **The bar graph on the next page shows the contribution of tourism (in ■ billion) to the GDP of Nigeria from 2004 to 2014. The 2024 figure is a forecast of how much the tourism industry will contribute to the total. Use the bar graph to answer the questions that follow.**

a) How much did tourism contribute to the GDP in 2004?

b) How much more was the contribution from 2004 to 2005?

c) Why do you think the contribution of tourism dropped in 2006?

d) Determine approximately the mean contribution of tourism to the GDP from 2004 to 2014.

e) Give two reasons why tourism is forecast to grow between 2014 and 2024.

Q-9 **The bar chart below shows the distribution of marks in a class test. Find the number of students in the class.**

Q-10 **A class of 30 students scored these marks in an examination. What percentage of students scored more than 40%?**

Q-11 **The number of counters brought to school by 50 students was recorded as follows:**

a) Construct a frequency table for these numbers.

b) Draw a bar graph to show this data set.

Q-12 **A survey recorded the number of people living in each of 40 houses as follows:**

a) Draw a bar graph to show this data set.

b) How many people are living in all the houses in total?

Q-13 **A shop sold different quantities of packets of coloured pencils on one day, and recorded the result in a bar graph below. There were twelve pencils in one packet.**

a) What colour was most popular?

b) What colour was least popular?

c) How many packets of yellow pencils were sold?

d) Calculate the total number of coloured pencils sold that day.

Q-14 **The table below shows how a student spends her day.**

Show this information on a pie chart.

Q-15 **A number of students were asked for their favourite sport. 1/4 of them said tennis, 1/8 basketball, 1/3 football and the rest said jogging.**

a) What fraction of the total chose jogging?

b) Calculate the angle of the sector representing basketball.

c) If 32 students choose football, how many chose tennis?

Q-16 **This pie chart below shows the nationalities of people staying in a hotel.**

a) Which of the five nationalities has the smallest number of people in the hotel?

b) What fraction of the people in the hotel are French?

c) If there are 288 people in the hotel altogether, how many of them are Dutch?

Q-17 **The table below shows the number of students in a university, and the faculties in which they are studying.**

Draw a pie chart to show this information.

Q-18 **The pass grades in an examination are A, B and C. The table shows the percentage of grades scored by students of a particular school.**

a) If there are 720 students in the school, calculate the number who failed.

b) Calculate the sector angles for the pass grades.

c) Calculate the number who passed with Grade A.

Q-19 **This table below shows the subjects and periods per week for JSS 3.**

Draw a pie chart to show this information.

Q-20 **The pie chart on the right shows the expenditure of a woman's salary for December.**

a) If the woman earned ■240 000, find how much she spent on: i) food; ii) rent; iii) other.

b) What fraction of her salary was used for accounts?

Q-21 **Using the bar graph below, draw a pie chart of the number of coloured pencils sold per day**

Q-22 **The line graph below shows the midday temperature over one week.**

a) On which day was the temperature the hottest?

b) What was the temperature on Day 7?

c) On which days was the temperature the same?

d) Use the graph to calculate the average temperature for the week.

Q-23 **Draw a line graph to represent the following information.**

Q-24 **Ozioma measures her heart rate every half hour during one morning, and she draws up the following table of results:**

a) Plot a line graph of the data in the table.

b) Describe what you notice about the graph.

c) Why do you think that her heart rate increases suddenly during the day?

Q-25 **The line graph below shows the weight of a baby over a period of 36 months.**

a) How much did the baby weigh at birth?

b) How much did the baby weigh at: i) 4 months ii) 32 months?

c) What was the baby's age when he weighed: i) 6 kg ii) 18 kg?

d) How much weight did he gain between birth and 12 months?

e) What was his average weight over the period recorded?

Q-26 **In 2014, there was a serious outbreak of the Ebola virus in West Africa. Look at the line graph below showing the number of cases and deaths from April 2014 to April 2015.**

a) When did the first case of Ebola occur? Give the month and year.

b) How many cases were reported by October 2014?

c) Between which months did the number of infections grow the most?

d) Why would you say the number of deaths and the number of reported cases are the same between April and May 2014?

e) Why would you say both graphs start levelling off in May 2015?

Q-27 **The graph below shows the number of internet users in Nigeria from 2013 with projections to 2018.**

a) How many people were using the internet in 2013?

b) By how much will the number of people who use the internet increase from 2015 to 2016?

c) Why do you think the number of internet users is increasing?

Chapter-11 Term 1 Simple equations involving fractions

Q-1 **Interpret each equation and solve the unknown variable.**

a) $3x = 21$

b) $4c = 10$

c) $2a + 1 = 9$

d) $3b – 10 = 11$

e) $5e + 3 = 14$

f) $4c + 10 = 37$

g) $12y – 48 = 0$

Q-2 **Solve for x.**

a) $x + 2 = –10$

b) $x/3 = 4$

c) $2x + 7 = 3$

d) $6x + 3 – 7 = x – 6$

e) $2x – 3 = 6x + 17$

f) $4x + 7 + 6x = –5x – 23$

Q-3 **Solve for the variable in each of the following:**

a) $x/12 = 10$

b) $b/11 = 7$

c) $(s + 10)/16 = 4$

d) $(y + 5)/10 = 1$

e) $(a - 2)/4 = 5$

f) $(18b + 8)/10 = 2$

g) $3(2c - 7)/4 = 7$

h) $2(4l - 10)/13 = 3$

i) $x/15 + 3 = 4$

j) $a/11 + 3 = 9$

Q-4 **Solve for the variable in each of the following:**

a) $2x/3 = 4$

b) $(x - 1)/4 = x/7$

c) $4/5 + v = 41/20$

d) $-11/5 = -2 + n$

e) $a/15 + 5 = 8 + 9/30$

f) $y/16 - 5 = 7 - 7/16$

g) $v/15 + 8 = 13 - v/8$

h) $x/3 + (2x - 1)/4 = 1$

Q-5 **Solve for the variable in each of the following:**

a) $2/a + 3/a = 7$

b) $2/(3x) + 1 = 1/x$

c) $3/x - 2 = 1/2 - 9/(2x)$

d) $3/(2x) - 1/(4x) = 3/(4x) - 1$

e) $(x - 1)/(3x) - 1/9 = (x - 3)/(9x)$

f) $5 + 8/x = 2(x + 4)/x$

g) $5/4 + 2/(3a) = 4 - (a - 3)/(12a)$

h) $4/(3x) + 1/5 = 1\ 1/3 + 1/(5x)$

Q-6 **Solve for the variable in each in the following:**

a) $3/(x – 1) = 2/(x + 2)$

b) $7/(x – 2) = 3/x$

c) $1/(2x + 1) = 4/(x – 2)$

d) $(2x + 1)/(x – 1) = (x + 2)/(–2)$

e) $(y + 1)/(y – 2) = 3/4$

f) $(x + 11)/(x – 1) = 2$

g) $(14 + y)/(y – 1) = 5$

h) $(2t + 1)/(t – 1) = (6t + 1)/(3t – 1)$

Q-7 **Half of a number, plus a fifth of two less than the number, is four less than the number. What is the number?**

Q-8 **I think of a number, subtract 6, divide by 5 and my answer is 4. What was the original number?**

Q-9 **Half of a number, added to a third of that number, is eight less than the number. What is the number?**

Q-10 **If the same number is added to the numerator and denominator of 7/9, the result is 5/6. What is that number?**

Q-11 **The product of two consecutive numbers is 210. What are these numbers?**

Q-12 **The length of a rectangle exceeds its breadth by 2 cm. What are the dimensions, if the area is 195 cm^2?**

Q-13 **If I had 15 beads fewer than what I have at the moment, I should have only a quarter as many as I have now. How many do I have now?**

Q-14 **A tank is 2/5 full of water. If 35 litres are used, the tank is 1/6 full. Determine the volume in a full tank.**

Q-15 **Ada-afo drives her car to Abuja at a speed of 100 km/h. She drives back home at 75 km/h. The total driving time was 7 hours. What is the distance to Abuja?**

Q-16 **One pipe fills a tank in 8 hours. Another pipe can fill the tank in 12 hours. How long will it take to fill the tank, if both pipes were operating at the same time?**

Q-17 **Nagodeallah can do a job in 3 hours, while it takes Osasumwen 2 hours. How long will it take them, if they work together?**

Q-18 **Two thirds of a number is three less than five-sixths of the same number. Calculate the number.**

Q-19 **A brother and sister are to divide an inheritance of ■12 000 in the ratio of 2 to 3. What amount will each receive?**

Q-20 **A piece of wire 60 cm long is to be cut into two pieces. The ratio of the lengths of the two pieces is 5 to 7. Find the length of each piece.**

Q-21 **Obioma went shopping and spent half of her money on shoes, a third on a blouse, a tenth to take her boyfriend to lunch, and she came home with ■200. How much did she start out with?**

Q-22 **Nesidu accidentally caught her beaded necklaces on a chair and it broke. Half of the beads fell onto the floor; a fourth rolled under a chair; a sixth fell into her lap; and three beads remained on the strand. How many were there originally on the strand?**

Chapter-12 Term 1 Simultaneous linear equations

Q-1 **Complete the table below by substituting the value given for x into the given equation to find the y values. Plot the points on a Cartesian plane and draw the straight-line graph.**

a) $y = \frac{1}{2}x$

b) $y = -x$

c) $y = x + 3$

d) $y = x - 1$

e) $y = -2x - 1$

Q-2 **Copy and complete the pair of tables for the given equations in each of the questions. Use these tables of values to plot the graphs of the equations. Give the coordinates of the point of intersection.**

a) $x + y = 6$; x | –1 | 0 | 1 | 2 | 3; y | 7 | | | | 4

b) $x - y = 2$; x | –1 | 0 | 1 | 2 | 3; y | –3 | | | | 3

Q-3 **Copy and complete the pair of tables for the given equations in each of the questions. Use these tables of values to plot the graphs of the equations. Give the coordinates of the point of intersection.**

a) $x + 2y = 7$; x | –1 | 1 | 3 | 5; y | | | |

b) $3x - 2y = -2$; x | –2 | 0 | 2 | 4; y | –2 | | |

Q-4 **Copy and complete the pair of tables for the given equations in each of the questions. Use these tables of values to plot the graphs of the equations. Give the coordinates of the point of intersection.**

a) $2x + 3y = 5$; x | | 1 | 4; y | 3 | 1 |

b) $4x + y = 0$; x | | ½ ; y | |

Q-5 **Copy and complete the pair of tables for the given equations in each of the questions. Use these tables of values to plot the graphs of the equations. Give the coordinates of the point of intersection.**

a) $2x - y = 3$; x | –1 | 0 | 1 | 2; y | | | |

b) $y + x = 3$; x | –1 | 0 | 1 | 2; y | | | |

Q-6 **Plot these pairs of lines on the same pair of axes and state the point of intersection of each pair of lines. Use substitution to test whether this is the solution of both equations.**

a) $2x + y = 5$ and $x + 3y = 5$

b) $2x + y = -3$ and $x - y = -3$

c) $y - x = -5$ and $x + y = -1$

d) $2x + 5y = 24$ and $4x + 3y = 20$

e) $2x + 3y = 5$ and $5x - 2y = -16$

Chapter-13 Term 2 Simultaneous linear equations

Q-1 **Use the elimination method to solve these simultaneous equations.**

a) $2x + y = 5$; $2x – y = 3$

b) $3x – y = 7$; $3x + y = 11$

c) $3x – y = 9$; $4x – y = –14$

d) $5x + 3y = 23$; $2x + 4y = 12$

e) $x – 2y = 4$; $3x + y = 9$

f) $2x + y = 8$; $5x – 7y = 6$

g) $3a + 2b = 13$; $2a + 3b = 12$

h) $4a + 3b = 24$; $3a + 4b = 25$

i) $8c + 3d = 11$; $4c + 5d = 9$

j) $4p – 3q = 2$; $5p – 2q = 6$

k) $9m – 4n = 1$; $11m – 3n = 5$

l) $7e – 3f = 8$; $5e – 3f = 4$

Q-2 **Use the substitution method to solve these pairs of simultaneous equations.**

a) $x + y = 10$; $x – y = 8$

b) $2x + y = 5$; $3x - 2y = 4$

c) $7x + 2y = 19$; $x - y = 4$

d) $4a + b = 14$; $a + 5b = 13$

e) $3a - b = 5$; $2a + 5b = 7$

f) $x + y = 4$; $2x + y = 5$

g) $p + 4q = 6$; $8q - p = 3$

h) $2p + 3q = 13$; $p + 5q = 13$

Q-3 **Two jets are flying towards each other from airports that are 1 200 km apart. One jet is flying at 250 km/h and the other jet at 350 km/h. If they took off at the same time, how long will it take for the jets to pass each other?**

Q-4 **Ifechi bought 20 shirts at a total cost of ■98 000. If the large shirts cost ■5 000 and the small shirts cost ■4 000, how many of each size did he buy?**

Q-5 **The diagonal of a rectangle is 25 cm longer than its width. The length of the rectangle is 17 cm longer than its width. What are the dimensions of the rectangle?**

Q-6 **The sum of 27 and 12 is equal to 73 more than an unknown number. Find the unknown number.**

Q-7 **The ratio between the two smaller angles in a right-angled triangle is 1 : 2. What are the sizes of the two angles?**

Q-8 **The lengths of the sides of an equilateral triangle are 3x + 1, y + 2 and 2y – x. Determine x and y.**

Q-9 **The length of a rectangle is twice the breadth. If the area is 128 cm², determine the length and the breadth.**

Q-10 **The sum of two consecutive odd numbers is 20 and their difference is 2. Find the two numbers.**

Q-11 **Nesidu is 21 years older than her daughter, Daraja. The sum of their ages is 37. How old is Daraja?**

Q-12 **Enofe is now five times as old as his son, Odiche. Seven years from now, Enofe will be three times as old as his son. Find the ages they are now.**

Q-13 **On a bus, 42 passengers paid fares adding up to ■5 400. There are x adults each paying ■120 and y children each paying ■60. How many children are on the bus?**

Q-14 **A choir has 85 singers. There are 23 more males than females in the choir. How many singers are female?**

Q-15 **Debara walks at 8 km/h and runs at 12 km/h. To walk to the office from his house takes him 20 minutes. Had he run twice as far, it would have taken him 27 1/2 minutes. How far is the office from his home?**

Q-16 **Ekemma travels x km at 8 km/h and y km at 20 km/h. Her total travelling time is 3.5 hours. The total time she takes to travel (2x + 4) km at 8 km/h and 3/4 km at 20 km/h is 5 hours. Find x and y.**

Q-17 **Ikponmwosa bought 15 kg of meat and 8 kg of fish for ■8 800. If he had bought 8 kg of meat and 15 kg of fish, the cost would have been ■8 300. Find the cost of 1 kg of meat and 1 kg of fish.**

Q-18 **A two-digit number decreases by 27 when the digits are swapped around. If the tens digit is 4 times the units digit, find the original number.**

Q-19 **The sum of two numbers is 17. The difference between twice the larger number and three times the smaller number is 4. What are the numbers?**

Q-20 **The sides of a rectangle are 4x + 3, 3x + 1, x + 6y and 4y – x. Find x and y, and the area of the triangle.**

Q-21 **The sides of an equilateral triangle are 2p, 5q – 2 and p + q + 5. Determine:**

a) p and q

b) the perimeter in metres

c) the area of the triangle

Q-22 **A two-digit number increases by 63 when the digits are swapped around. If the units digit is one less than 5 times the tens digit, find the original number.**

Chapter-15 Term 2 Simple and compound interest

Q-1 **A bag of fertiliser is required for a farm of two hectares. How many bags of fertiliser are required for a farm of seven hectares?**

Q-2 **To lay the floor of a room, Bako needs four bags of cement. For every one bag of cement, Bako uses three wheelbarrows of sand. Find how many wheelbarrows of sand he will need to lay the floor.**

Q-3 **Mr Okonta mixes 2 kg of flour with seven eggs to make enough cake for eight people. If 12 people are visiting him, what proportions of flour and eggs will he mix?**

Q-4 **A man is paid ■50 000 for eight days of work. What is his pay for:**

a) one day

b) 10 days

c) 22 days

Q-5 **A car travels 122 km in two hours. How far does it travel in:**

a) one hour

b) four hours

c) x hours

Q-6 **Pay & Take sells a pocket of 25 Granny Smith apples for ■320. Shop More sells their pocket of 16 apples for ■256. Which is the cheaper option?**

Q-7 **Jimo's Cash & Carry sells Extra Hot Curry Powder at ■45 for 125 g. Ayoola's Deli sells the same curry powder at ■160 for 500 g. Which is the better deal?**

Q-8 **Six pencils cost ■195. What is the cost of eleven of the same type of pencil?**

Q-9 **The cost of a train ticket varies according to the distance travelled. It costs ■250 to travel 320 km.**

a) Calculate the cost of a journey of 140 km.

b) Calculate how far one can travel for ■950.

Q-10 **If 12 tomatoes cost ■415, what will you pay for 20 tomatoes?**

Q-11 **Consider the graph below, and answer the questions that follow.**

a) What kind of proportion does the graph represent?

b) Give five examples from real life that involve this relationship.

Q-12 **It costs ■25 for one minute of prepaid airtime. The graph on the next page shows the relationship between the cost of airtime and duration of calls. Study the graph, and answer the questions that follow.**

a) Are the call cost and duration of the call directly proportional? Give a reason for your answer.

b) Use the graph to estimate the cost of speaking for 4.5 minutes.

c) Write a rule that can be used to work out the cost of a phone call for each minute.

Q-13 **The table below shows the cost of petrol for a given distance travelled.**

a) Calculate the missing values.

b) Describe the relationship between the cost of petrol and the distance travelled.

c) Plot the above points on a graph, with the distance travelled on the x-axis, and the cost of petrol on the y-axis.

Q-14 **Use the graph below (not drawn to scale) to answer the questions.**

a) What form of proportion is suggested here?

b) Calculate the value of k.

Q-15 **The table below shows the height of a candle after burning for a certain amount of time.**

a) Draw a graph to show the relationship between the height of the candle and time.

b) Use your graph to find the height of the candle after 1.5 hours.

c) How long will it take for the candle to burn down to 12.5 cm?

Q-16 **The graph below shows the amount of money a man earns against the number of days worked.**

a) Draw up a table that shows the amount he earned for the first five days worked.

b) Divide the man's salary by the number of days. What do you notice?

c) Use the graph to predict what the man will earn after eight days of work.

Q-17 **Biola owns a supermarket and makes a profit of ■70 000 every week. If the rate of profit remains the same each day, complete the table above to show her profit.**

a) What is the relationship between the days and the amount of profit?

b) Draw a graph of the relationship between the number of days and profit.

c) Do you think that this graph is useful to Biola to predict her profit? Give a reason for your answer.

Q-18 **Look at the following tables and say whether x and y are directly proportional, inversely proportional, or neither.**

a) x: 2, 4, 6, 8 ; y: 7, 14, 21, 28

b) x: 2, 4, 6, 8 ; y: 7, 16, 23, 30

c) x: 5, 10, 20, 40 ; y: 8, 4, 2, 1

Q-19 **A bag of corn can feed 50 chickens for 12 days.**

a) For how many days will the same bag feed 40 chickens?

b) How many bags of corn are needed to feed 20 chickens for 30 days?

Q-20 **Fifteen men build a wall in five days. How long will it take the following number of men to build the wall?**

a) one man

b) 10 men

c) 20 men

Q-21 **A 3-year-old girl has six sisters. Her youngest sister is 4 years old.**

a) How many sisters did she have when she was 1 year old?

b) How many sisters will she have when she is 5 years old?

c) How many sisters will she have when she is 17 years old?

Q-22 **A piece of land has enough grass to feed eight cows for two days. How long will the feed last:**

a) for one cow

b) for 12 cows

c) for x cows?

d) If the farmer triples the size of the land, how many cows could he feed for two weeks?

Q-23 **If it takes Ebhalelame five days to build a house, and it takes Emem seven days to build a house, how long will it take Ebhalelame and Emem to build a house together?**

Q-24 **Five builders take 24 days to build a new classroom.**

a) How long will it take 10 builders to build the classroom?

b) How long will it take one builder to build the classroom?

c) How long will it take to build the classroom, if there are eight builders?

d) How long will it take 20 builders to build the classroom?

Q-25 **The school kitchen makes sandwiches to sell at break time each day. It takes two people three hours to make the sandwiches.**

a) How long will it take one person?

b) How long will it take six people?

Q-26 **The community needs a bridge to be built in two weeks. The workers work every day of the week, except on Sunday. What is the smallest number of workers required to finish the bridge in time?**

Q-27 **It takes nine Mathematic teachers five working days to mark the exams. How many teachers would it take to mark the exams in the following times?**

a) three days

b) four days

c) If it takes 15 days to mark the exams, how many teachers are marking?

d) How long will it take p teachers to mark the exams?

Q-28 **Consider the graph below, and answer the questions that follow.**

a) What kind of proportion does the graph represent?

b) Give five examples from real life that involve this relationship.

Q-29 **A man wants to build a rectangular pool with an area of 36 m². He is considering the dimensions he could use.**

a) Fill in the missing values in the table to help him decide on the possible lengths and breadths he could use. The dimensions are in metres.

b) Draw a graph of the above relationship.

c) What will the breadth of the pool be, if the length is 2.5 m?

Q-30 **On the next page is a graph of the number of workers against the time taken in days to complete a job.**

a) What form of proportion is suggested here?

b) How many days will nine men take to complete the job?

c) If it took workers three days to complete the job, how many workers were working?

Q-31 **The table below shows the relationship between the time it takes for a tennis ball to travel from one side of the court to the other.**

a) Describe the relationship between the speed and the time taken.

b) Draw a graph of the relationship.

c) How far has the ball travelled after 0.5 seconds? (Distance = speed × time)

d) Complete the table below for 1/speed.

e) Draw a graph of time against 1/speed and describe the relationship between the variables.

Q-32 **If 24 sweets are shared between four children, each child will receive six sweets. If the sweets are shared by three children, each will receive eight sweets.**

a) Describe the relationship between the number of children and the number of sweets.

b) The graph below shows the relationship between the number of sweets and the number of children. Draw up a table of values using the graph.

c) Will there be enough sweets for 14 children? Give a reason for your answer.

Q-33 **Your class is travelling by bus on an educational trip. The bus can seat 20 people and costs ■8 000.**

a) Describe the relationship between cost per person for the bus and number of passengers.

b) Complete the table below.

c) Draw a graph to show the relationship between the number of passengers and the cost per person.

Q-34 **Without using a calculator, find the reciprocals of these numbers.**

a) 1/8

b) 0.72

c) 37

d) 6

e) 2/5

f) 3/20

g) 0.51

Q-35 **Use a table to find the reciprocals of the following numbers.**

a) 4

b) 25

c) 200

d) 0.2

e) 0.5

f) 6 250

g) 0.25

h) 1.4

i) 1.8

j) 1/x

Q-36 **The sets of numbers in the tables below are directly proportional to each other. Find the constant of proportionality and complete the missing numbers in the tables.**

a) 3 m² of carpeting that costs ■20.

b) The average cost of travelling 100 km in my car is ■530.

c) Ten books that cost ■430.

d) A six pack of cooldrinks that costs ■600.

e) If a and b are directly proportional.

Q-37 **If z is directly proportional to x, and z = 18 when x = 6:**

a) express z in terms of x

b) calculate the value of z, when x = 15

c) calculate the value of x, when z = 75

Q-38 **If $A \propto r^3$, copy and complete the following table.**

Q-39 **If y varies directly as the square of x, and y = 12 when x = 4, find y when x = 9.**

Q-40 **V varies directly as t + 3. If V = 28 when t = 1, calculate:**

a) the value of V, when t = 3

b) the value of t, when V = 49

Q-41 **Given that $r \propto \sqrt{A}$, copy and complete the table.**

Q-42 **If y – 3 is directly proportional to x^2 and y = 5 and x = 2, find y when x = 6.**

Q-43 **The amount of energy, E, stored in an elastic band varies as the square of the extension, x. When the elastic is extended by 2 cm, the amount stored is 128 joules.**

a) What is the amount of energy stored when the extension is 8 cm?

b) What is the extension when the amount of stored energy is 32 joules?

Q-44 **If p and q are inversely proportional, complete the following table.**

Q-45 **The table below holds for the relationship 'y varies inversely as x varies'. Find the values of a and b.**

a) value of a

b) value of b

Q-46 **If m is inversely proportional to n, and that m = 2 when n = 5, find:**

a) the relationship between m and n

b) the value of m, when n = 10

c) the value of n, when m = 6

Q-47 **p is inversely proportional to q and p = 12 when q = 4.**

a) Calculate the constant of proportionality, k, and then find the rule relating p and q.

b) Find three more points and plot a graph of the relationship between q and p.

Q-48 **If y is inversely proportional to x, and y = 2 1/2 when x = 2, find y when x = 4.**

Q-49 **If S varies inversely to the square of t, and if S = 8 when t = 2, find S when t = 4.**

Q-50 **Given that T varies inversely to $\sqrt{x}$, if T = 1.2 when x = 100, calculate:**

a) the value of T when x = 4

b) the value of x when T = 3

Q-51 **Given that $r \propto 1/\sqrt{x}$, copy and complete the following table.**

Q-52 **H varies directly with the square of G and inversely with the root of U.**

a) Given that H = 4 when G = 25, and U = 169, find the value of the constant of proportionality. Then, write the formula that relates the variables.

b) Find H, when G = 7 and U = 81.

c) Find G, when H = 150 and U = 36.

Q-53 **Y varies directly as the square of B and varies inversely as V.**

a) Express J in terms of B and V.

b) Calculate the constant of proportionality, when J = 600, V = 150 and B = 30.

c) Calculate B, when J = 800 and V = 40.

Q-54 **If Y varies directly as G and inversely as the square root of I; and Y = 7, when G = 4, I = 8.**

a) Determine the relationship between Y, G and I.

b) Find Y, when G = 18 and I = 25.

c) Find G, when Y = 12.5 and I = 81.

d) Find I, when Y = 20 and G = 4.

Q-55 **F varies directly as the square of H and inversely as the square root of C; F = 48 when H = 4, and C = 25.**

a) Express F in terms of H and C.

b) Find F, when H = 25 and C = 30.

c) Find C, when F = 12 and H = 7.

Chapter-16 Term 2 Trigonometry

Q-1 **Umeala invests ■6 000 at 9% per year for three years. Calculate the following.**

a) Draw up similar tables used in the example above for simple interest and compound interest.

b) Calculate the difference between the simple interest and compound interest at the end of each year.

c) Which option of investment should Umeala choose? Give a reason for your answer.

d) Use your tables to draw graphs of each investment.

e) After how many years does Umeala's money double, using compound interest?

f) Use your graph to calculate the difference in the compound and simple interest value of the investment after five years.

Q-2 **You invest ■320 000 at 12% p.a. compound interest. Use the table below to calculate what your investment will be worth in three years.**

Q-3 **You borrow ■25 000 at 8% p.a. Do the following calculations – first based on simple interest, and then on compound interest.**

a) Calculate what the amount owed will be after five years.

b) Calculate the interest earned on the loan.

Q-4 **How much simple interest is payable on a loan of ■20 000 for a year, if the interest rate is 10% per annum?**

Q-5 **How much compound interest is payable on a loan of ■20 000 for a year, if the interest rate is 10% p.a.?**

Q-6 **Discuss the following questions.**

a) Which type of interest would you like to pay, if you are the borrower?

b) Which type of interest would you like to earn, if you were an investor?

Q-7 **Calculate the simple interest (SI) on ■65 000 at 11.5% p.a for 4 ½ years.**

Q-8 **Amenawon lent his sister ■10 000 at 12% p.a. simple interest. She repaid him after 3 years. How much did he receive?**

Q-9 **Edidiong borrowed ■25 000 from his brother and agreed to pay it back after 3 years at 12% p.a. simple interest. Calculate the interest amount Yomi must pay his brother.**

Q-10 **Calculate the interest amount on an investment of ■45 000 at an interest rate of 6% p.a. for 7 years.**

Q-11 **An amount of ■600 000 is invested in a savings account which pays simple interest at a rate of 7.5% p.a. Calculate the balance accumulated by the end of 2 years.**

Q-12 **Calculate the accumulated amount in the following situations:**

a) a loan of ■80 000 at a rate of 8% for 1 year

b) an investment of ■550 000 at a rate of 12.5% p.a. for 6 years

Q-13 **Calculate the value of an investment ■16 000 at 9% simple interest p.a. for 36 months.**

Q-14 **The SI on an investment of ■160 000, invested at 12.8%, for a number of years was ■880. Calculate T.**

Q-15 **An investment of ■190 000 amounted to ■14 000 after 5 years. What was the interest rate?**

Q-16 **A woman invested ■90 000 at 9.5% per annum simple interest for 1 years. The simple interest earned was ■21 000. Calculate T.**

Q-17 **Udo wanted to calculate the number of years she needed to invest ■15 000, in order to accumulate ■40 000. She has been offered a simple interest rate of 8.2% p.a. How many years will it take for the money to grow to ■40 000?**

Q-18 **Sangodela made a deposit of ■80 000 in the bank for his 5-year-old son's 21st birthday. He has given his son the amount of ■92 000 on his birthday. At what rate was the money invested, if simple interest was calculated?**

Q-19 **If ■9 500 is invested for 5 years at 9% p.a., determine:**

a) the simple interest

b) the total amount at the end of the period

Q-20 **Aderibigbe invested ■72 500 for 12 years and earned ■47 700. What was the interest rate per annum?**

Q-21 **Akanmu invested ■65 000 for 8 months at a simple interest of 8 3/4%. Find the simple interest amount.**

Q-22 **Somadina invests ■250 000 in a savings account on his 21st birthday. The interest paid on his savings is 11% p.a., compounded annually. Calculate the total value of the savings when he turns 40.**

Q-23 **A woman wants to invest ■500 000 into an account that offers a compound interest rate of 6% p.a. How much money will be in the account at the end of 4 years?**

Q-24 **An amount of ■55 000 is invested in a savings account which pays a compound interest rate of 7.5% p.a. Calculate the balance accumulated at the end of 2 years.**

Q-25 **How much will Oisagie have in his account, if he invests ■170 000 at 10.5% p.a. compound interest for 7 years?**

Q-26 **How much will I have in my account, if I invest ■145 000 for 4 years at 8% p.a. compound interest?**

Q-27 **You want to buy a car for ■3 500 000 in 3 years' time. You invest ■960 000 at 12% p.a. for the 3 years, compound interest. Will you have enough money?**

Q-28 **Find the final amount, if the following amounts are invested, compound interest.**

a) ■65 000 at 11% p.a. for 5 years

b) ■40 000 at 9% p.a. for 3 years

c) ■110 000 at 14.5% p.a. for 4.5 years

Q-29 **Iberedembobong borrows ■32 000 for a period of 6 years. He sees the two advertisements on the right: 15% per annum compounded annually; 17% per annum simple interest. By doing appropriate calculations, determine which is the best option for Iberedembobong.**

Q-30 **Calculate how much you would earn, if you invested ■8 000 for 1 year at the following interest rates:**

a) 6.85% simple interest

b) 4.00% compound interest

Q-31 **Calculate the compound interest for the following:**

a) A ■30 000 loan for 2 years at 5% p.a.

b) A ■25 000 investment for 3 years at 6% p.a.

c) A ■15 000 loan for 1 year at 16% p.a.

Q-32 **Adama borrows ■400 000 to buy a car. He is charged compound interest at 8% p.a. He repays ■135 000 after 1 year. How much should he repay at the end of the third year to clear his debt?**

Q-33 **Adeyanju borrows ■205 000 at 7% compound interest. He pays back ■55 000 at the end of each year. How much does he still owe after he has made his second repayment?**

Q-34 **A man borrows ■7.5 million to buy a building at an interest rate of 8% per annum. He pays ■875 000 at the end of each year. How much does he still owe at the end of 3 years?**

Q-35 **A car is worth ■2 200 000 today. It depreciates at a rate of 14%. What is the value in 4 years' time?**

Q-36 **A second-hand farm tractor, worth ■965 000, has a limited useful life of 5 years and depreciates at 20% p.a. Determine the value of the tractor at the end of each year over the 5-year period.**

Q-37 **On 1 January 2008, the value of my Volkswagen Golf was ■3 500 000. Each year after that, the car's value decreased by 15% of the previous year's value. What was the value of the car on 1 January 2012?**

Q-38 **Etorro buys a truck for ■1 500 000 and depreciates it by 9% p.a. What is the value of the truck after 14 years?**

Q-39 **Okechukwu wants to sell his car in 5 years' time. The rate of depreciation is 14% p.a., and the current value of the car is ■1 800 000. Calculate the value of the car in 5 years' time.**

Q-40 **Adelakun buys an air conditioner costing ■70 000. If the rate of depreciation is 12% p.a., what is its value after 4 years?**

Q-41 **Adama bought a blender for ■5 000. If its price depreciates by 10% p.a., how much will she be able to sell it for in 2 years' time?**

Q-42 **A new car cost ■64 000. It depreciates by 22% in the first year, 18% in the second year and 13% in each of the following years. Find the value of the car after 3 years.**

Q-43 **A car loses its value by 20% each year. If it cost ■540 000, find its value after 2 years.**

Q-44 **A bus was bought in 1997 for ■700 000 and its value depreciated at the rate of 20% p.a. Calculate the value of the bus in 2001.**

Q-45 **The price of a bag of oranges is ■300. How much will it cost in 9 years' time, if the inflation rate is 12% p.a.?**

Q-46 **A long-lost relative paid ■7 000 000 for a house 15 years ago and you inherit the property. What is the value of the house today, if the inflation rate is calculated at 17% p.a.?**

Q-47 **You purchase a car for ■1 700 000 and inflation is expected to be 8% p.a. for the next 5 years. The depreciation rate is 13%.**

a) In which year will your car lose the most value?

b) What will the value of your car be after 5 years?

c) What would the cost of a new car be in 5 years' time?

d) If you used your old car as a trade-in in 5 years' time, how much more would you need to buy a similar new car?

Q-48 **In January 2012, Tunde worked for a hotel chain. Tunde's gross annual salary was ■200 000. Tunde's employer offers him an "inflation-linked" salary increase of 5% for 2013. What will Tunde's gross salary be after this increase?**

Q-49 **The average price of a movie ticket is ■800. If the average rate of inflation is 9.2% p.a., what would the price of a movie ticket be in 6 years' time?**

Q-50 **Study the advertisements below from Shop Smart Supermarket. Use them to answer the questions that follow.**

a) Calculate the percentage increase in the prices of chicken and milk from 2014 to 2015. Remember that percentage increase = (new price – old price)⁄old price × 100%.

b) If the price of rice increased by 10%, what would its price be in 2015?

c) Which item had the highest percentage increase?

d) What would you say are the factors that influence inflation?

e) Add the 2015 prices of the three items and calculate what these three items would cost in 2020, if inflation were 6% p.a.

Q-51 **Adaobi bought a machine costing ■65 000. How much will the same machine cost in 2 years' time, if the rate of inflation is 15% p.a.?**

Q-52 **If the rate of inflation is 25% per annum, how long will it take for the price of an item to double?**

Q-53 **If the value of a value increases by 25% p.a., find the percentage by which the price increases each year.**

Q-54 **The present cost of a DVD player is ■5 800. If the inflation rates for the next 2 years are 20% and 10% respectively, find the price of the DVD player in 2 years' time.**

Chapter-17 Term 3 Similar shapes

Q-1 **Each of the triangles on the next page has an indicated angle. The sides are marked with their lengths, given as numbers or variables (letters). For each triangle, state which side is the hypotenuse, opposite or adjacent to the designated angle. Record the lengths and variable letters in the table below**

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Q-2 **Draw an angle of 75°.**

Q-3 **Create any three right-angled triangles, just like you did in the section above.**

Q-4 **Fill in the table and compute the ratios.**

Q-5 **Complete each of the following using ■ABC.**

a) sin A

b) cos A

c) tan A

d) sin C

e) cos C

f) tan C

Q-6 **For the given triangle, tan θ = 12/9.**

a) Fill the 12 and 9 in the correct position on the diagram.

b) Find the remaining side.

c) Determine sin θ.

Q-7 **Fill in the missing angle.**

a) tan… = 20/15

b) sin… = 15/25

c) cos… = 15/25

Q-8 **Copy and complete this table, using a scientific calculator. All results should be given to four decimal places.**

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Q-9 **Use tables to determine the following.**

a) tan 65°

b) sin 38°

c) cos 74°

d) tan 49°

e) $\cos^2 26°$

f) ¼ cos 20°

Q-10 **Use a calculator to determine the following.**

a) tan 45°

b) 3 sin 27.3° – 2

c) (sin 16.1°)/(cos 73.9°) – 2 sin 30°

Q-11 **If A = 60° and B = 35°, determine the following to two decimal places.**

a) sin (A + B)

b) sin A + sin B

c) $\cos^2 A$

d) 2 cos A

e) tan (A/B)

f) 1/cos A – 1/sin B

Q-12 **Use your calculator to find the following. Give your answers correct to one decimal place.**

a) the acute angle with sine of 0.62

b) the acute angle with cosine of 0.434

c) the acute angle with tangent of 4.83

d) the acute angle with sine of 6/17

e) cos■¹(2/3)

f) tan■¹(1/8).

Q-13 **Use tables or a calculator to determine the following angles, correct to one decimal place.**

a) tan θ = 1.7

b) sin θ = 0.8

c) cos θ = 0.32

d) tan θ = 5 3/4

e) sin θ = 2/3

f) cos α = 1.2

g) 4 cos θ = 3

h) cos 4 θ = 0.3

i) sin α + 2 = 2.65

Q-14 **Find the size of the unknown angle in each diagram. Give your answer correct to the nearest degree.**

a)

b)

c)

d)

e)

f)

Q-15 **Find the unknown sides in the figures below. Give your answers to the same number of decimal places as given in each side length on the figure.**

a)

b)

c)

d)

e)

f)

Q-16 **If cos θ = 4/5, find the value of:**

a) sin θ

b) tan θ

Q-17 **If sin θ = 12/13, find the value of:**

a) $2 \cos \theta + 3 \sin \theta$

b) $\tan^3 \theta$

Q-18 **Solve for x and y in the following triangles. Use trigonometry only.**

a)

b)

Q-19 **Use the figure to find:**

a) the length of AC

b) the length of BC

c) the length of AB.

Q-20 **Find the sides labelled x and y in the figure below.**

Q-21 **Use the lengths shown in the figure to calculate:**

a) $(\sin 30°)^2 + (\cos 30°)^2$

b) $(\sin 60°)^2 + (\cos 60°)^2$

Q-22 **Use the diagram and determine:**

a) CD

b) AB

Q-23 **In a right-angled triangle, one angle is 50°. The side opposite this angle is 5 cm. What is the length of the hypotenuse side?**

Q-24 **In a right-angled triangle, the hypotenuse is 8 m and one angle is 55°. What is the length of the shortest side?**

Q-25 **Hassana is standing beside a lighthouse on a sunny day. She measures the length of her shadow, which is 4.8 m and the length of the shadow cast by the lighthouse, which is 75 m. Hassana is 1.6 m tall. How tall is the lighthouse? (Draw a diagram to help solve the problem.)**

Q-26 **Ibekwe flies a kite on a 17 m string at an inclination of 63°.**

a) What is the height h of the kite above the ground?

b) If Ibekwe's friend Egbede stands directly below the kite, calculate the distance between the two friends.

Q-27 **The length of a rope, from the top of a mast to a point 20 m from the foot of a mast, is 60 m. Calculate the height of the mast.**

Q-28 **A boy travels in a boat at an angle of 20° to the river bank. If he travels 200 m before reaching the opposite bank, calculate the width of the river.**

Q-29 **Determine the length of the diagonal across the floor of a hall, if the width of the hall is 20 m and the angle the diagonal makes with the width is 70°. Calculate the length of the hall.**

Q-30 **When a ladder of length 25 m rests against a wall, it makes an angle 37° to the wall. Find the distance between the wall and the base of the ladder.**

Q-31 **Determine:**

a) PQ

b) PR

c) P■

Q-32 **A rectangle has sides of length 18 cm and x cm. The acute angle between the diagonals of the rectangle is 40°. Determine x.**

Q-33 **A right-angled triangle has sides of lengths 5 m, 12 m and 13 m. Calculate, to one decimal place, the sizes of all the angles in this triangle.**

Q-34 **Use the figure on the right to determine the values of:**

a) TU

b) SV

c) ST■V

Q-35 **Use the figure below to find the values of:**

a) PQ

b) PR

c) SP

Q-36 **In the figure, AB■C = AC■D = 90°, AC■B = 30° and AD■C = 45°. Given that CD = 10 cm:**

a) State the length of AC

b) Calculate the length of AB.

Q-37 **In the figure, AD = 8 cm, CD = 17 cm, BC = 5 cm and CÂD = 90°. Find:**

a) AC

b) AB

c) BD.

Q-38 **The diagram shows a trapezium ABCD, in which AB■C = BÂD = 90°, AB = 8 cm, BC = 16 cm and AD = 10 cm. Calculate the perimeter of the trapezium.**

Q-39 **The lengths of the sides of an isosceles triangle are 10 cm, 10 cm and 16 cm. Find the sizes of the angles of the triangle.**

Q-40 **In ∆PQR, the point S lies on QR, such that PS is perpendicular to QR. Given that PS = 7 cm, SR = 24 cm and QS = 5 cm, calculate:**

a) to two decimal places, the lengths of PQ and PR

b) to the nearest degree, PQ■R, PR■Q and QP■R

c) the area of ∆PQR.

Q-41 **In the figure, AB is a chord of the circle. Given that AB = 24 cm and AÔB = 120°, calculate:**

a) the exact value of the radius of the circle

b) the area of ∆AOB.

Q-42 **Kufreabasi stands on land, 200 m away from one of the towers on a bridge. He reasons that he can calculate the height of the tower by measuring the angle to the top of the tower and the angle to its base at water level. He measures the angle of elevation to its top as 37° and the angle of depression to its base as 21°. Calculate the height of the tower to the nearest metre.**

Q-43 **Amadia works for an oil company. She needs to drill a well to an oil deposit. The deposit lies 2 300 m below the bottom of a lake, which is 150 m deep. The well must be drilled at an angle from a site on land. The site is 1 000 m away from a point directly above the deposit. Determine the angle at which the well should be drilled.**

Q-44 **From the top of the Chrysler Building, which is 320 m high, the angle of elevation to the top of the Empire State Building is 26°, and the buildings are 250 m apart. The angle of depression from the Chrysler Building to the foot of the Empire State Building is x. If the buildings are in the same horizontal plane, calculate:**

a) x, the angle of depression

b) the height of the Empire State Building.

Q-45 **Tutu and Abadom are trying to determine the height of the flagpole, AB, using trigonometry. Tutu stands 20 m away from Abadom. They are on opposite sides of the pole. The angle of elevation from Tutu to the top of the pole is 29°, while the angle of elevation from Abadom to the top of the pole is 48°. Determine the height of the flagpole, AB.**

Q-46 **Calculate the height of a cliff, if the angle of depression of a boat at sea is 42°. The boat is 700 m away from the foot of the vertical cliff.**

Q-47 **The height of a lighthouse is 30 m. The angle of depression of a ship is 7°. Calculate the distance of the ship from the lighthouse.**

Q-48 **Find the length of the shadow of a flagpole that is 80 m tall, when the altitude of the Sun is 25°.**

Q-49 **A boy who is 1.6 m tall observes the angle of elevation of the top of a coconut tree to be 28°. The boy is standing 20 m from the foot of the coconut tree. Find the height of the tree.**

Q-50 **To find the height of a tower, a girl took measurements from two points that were in a straight line on horizontal ground at the foot of the tower. The angles of elevation of the top of the tower from the two points were 19° and 27°. The points were 60 m apart.**

a) Sketch a diagram of the measurements.

b) Calculate the distance from the nearest point to the foot of the tower. Hence calculate the height of the tower.

Q-51 **A man standing 80 m away from a tower observes the angles of elevation to the top and bottom of a flagpole standing on the tower as 41° and 37°, respectively. Calculate the height of the flagpole.**

Q-52 **A car drives for 6 km at a bearing of 030°. How far north is the car from its starting point?**

Q-53 **A beach is on a bearing of 064° from an airport, at a distance of 20 km. How far east is the beach from the airport?**

Q-54 **Town B lies at a bearing of 037° from Town A, and Town C is at a bearing of 127° from Town B. The distance between Town A and Town B is 7 km, and the distance between Town B and Town C is 11 km.**

a) Determine the distance between Town A and Town C.

b) Determine the bearing of Town A to Town C.

Q-55 **The bearing of X from P is 090° and the bearing of Y from P is 180°. Given that the distances PX and PY are 20 km and 25 km respectively, calculate:**

a) the bearing of X from Y

b) the bearing of Y from X.

Q-56 **P is 15 km from O on a bearing of 000° and Q is 9 km from O on a bearing of 270°. A boy starts from Q and rides in the direction 020°**

a) Calculate the distance the boy has to ride before his bearing from P is 270°.

b) Find the distance he is from P when his bearing is 270° from P.

c) Find his bearing at point P from O.

Q-57 **Three towns X, Y and Z lie on a straight road on a bearing 090° from X. Y is 10 km from X and Z is 25 km from X. Another town P is 10 km from X on a bearing 150° . Calculate:**

a) the distance and bearing of P from Y

b) the distance and bearing of P from Z.

Chapter-18 Term 3 Area of plane shapes

Q-1 **Solve:**

a) Construct an equilateral triangle with sides of 9 cm. What is the size of the angles of the triangle? Give a reason for the values that you have measured.

b) Construct an equilateral triangle with sides of 6 cm.

Q-2 **Given xy = pq, form a proportion in which:**

a) x is one of the extremes

b) x is one of the means

c) p is the first term

Q-3 **Find the value of x and y in these proportions.**

a) $9/x = 3/5$

b) $3 : 5 = x : 4$

c) $2/x = y/8 = 1/4$

Q-4 **Find the ratio of a to b in:**

a) $a/3 = b/2$

b) $2a – 5b = 0$

c) $(a + b)/(a – b) = 7$

Q-5 **Draw a square with sides 2 cm.**

Q-6 **Draw a rectangle with length 3 cm and breadth 2 cm.**

Q-7 **State the values of all four angles of the two quadrilaterals.**

Q-8 **Solve:**

a) Calculate the ratios of the pairs of sides of the two quadrilaterals.

b) What conclusion can you draw about the similarity of the two quadrilaterals?

Q-9 **Use the two triangles to complete the statements.**

a) $\angle$ABC corresponds to _____

b) $\angle$BCA corresponds to _____

c) $\angle$CAB corresponds to _____

Q-10 **ΔXYZ is similar to ΔKLM. Name all the corresponding sides.**

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Q-11 **Are the following pairs of triangles similar? If they are similar, write the vertices in the correct order.**

a)

b)

c)

d)

Q-12 **Given that ∆PQR is similar to ∆ABC, complete the extended proportion AB/ = BC/ = CA/ .**

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Q-13 **Use ∆ABZ in which Â = X■Z to answer the questions that follow.**

a) Name two triangles in the diagram that are similar.

b) Complete the proportion XY/ = ZY/ = XZ/ .

c) Given that XY = 4, BA = 10 and ZY = 2, find ZA.

Q-14 **Given that a triangle has two angles equal to 35° and 20°, draw the triangle.**

a) Draw another triangle similar to the triangle in Question 1(a).

b) Draw a third triangle similar to the triangles in Question 1(a) and (b).

c) How many triangles can you draw that are similar to the first triangle?

Q-15 **Giving reasons, state which of the following shapes are similar:**

a) any two isosceles triangles

b) any two equilateral triangles

c) any two squares

d) any two rectangles

e) any two rhombuses

f) any two trapeziums

g) any two regular polygons

h) any two regular polygons with the same number of sides

Q-16 **Consider several examples of similar triangles. What can you conclude about the ratio of their perimeters?**

Q-17 **Which of these triangles are not similar to triangle e)?**

Q-18 **Find the scale factor for the sides of these pairs of similar triangles.**

a)

b)

c)

Q-19 **Give reasons why each of these pairs of triangles are similar.**

a)

b)

c)

Q-20 **In the right-angled triangle ABC, BD is perpendicular to AC.**

a) Find three pairs of triangles that are similar, stating reasons for your answer.

b) Write the corresponding ratios for each set of similar triangles.

Q-21 **ABC is an isosceles triangle in which AB = AC and BD bisects $\hat{A}BC$. Given that $B\hat{A}C = 36°$:**

a) Find two similar triangles in the figure.

b) Give reasons why the triangles in (a) are similar.

Q-22 **In the figure, ABCD is a parallelogram. State reasons why ΔFDE and ΔBCE are similar.**

Q-23 **The following diagram shows two similar triangles.**

a) What is the length of side GE?

b) What is the scale factor from ΔEFG to ΔEBD?

Q-24 **The following diagram shows two similar rectangles.**

a) What is the scale factor from rectangle EFGH to rectangle ABCD?

b) What is the length of side CD?

Q-25 **The following diagram shows three similar triangles.**

a) What is the length of side EG?

b) What is the scale factor of ΔHIJ to ΔEFG?

c) What is the perimeter ratio of triangle ΔEFG to ΔABC?

d) What is the length of side AB?

Q-26 **Determine if the triangles below are similar, and explain your reasons. Find the lengths of the missing sides. All measures are in centimetres.**

a)

b)

c)

d)

e)

f)

Q-27 **Given that ∆ABC ||| ∆PQR:**

a) Calculate the ratio PR ⁄ AC.

b) Calculate x.

c) Calculate y.

Q-28 **Find the value of x in each figure.**

a)

b)

c)

Q-29 **Use graph or grid paper to find the image of A(7; 3), B(9; 3) and C(7; 8), taking the centre of enlargement at (0; 0) and a scale factor of ½.**

Q-30 **Use graph or grid paper to find the images of the objects below, using the given centres of enlargement or reduction and scale factors.**

a) Object: A(2; 4), B(4; 2), C(5; 5); Centre: (0; 0); Scale factor: +3

b) Object: A(2; 4), B(4; 2), C(5; 5); Centre: (0; 0); Scale factor: –2

c) Object: A(2; 4), B(4; 2), C(5; 5); Centre: (0; 0); Scale factor: –½

d) Object: A(1; 2), B(1; 4), C(2; 4); Centre: (0; 0); Scale factor: +2

e) Object: A(2; 1), B(4; 1), C(4; 4), D(2; 4); Centre: (–2; –3); Scale factor: +4

f) Object: A(7; 6), B(11; 8), C(9; 10); Centre: (–3; –4); Scale factor: +½

g) Object: L(6; 4), M(10; 4), N(10; 8), P(6; 8); Centre: (4; 6); Scale factor: +3⁄2

Q-31 **∆PQR and ∆P′Q′R′ are object and image, respectively. In each case, plot the object and the image on the same set of axes and describe the enlargement or reduction fully.**

a) P(1; 0), Q(5; 1), R(1; 3) and P′(10; 9), Q′(2; 7), R′(10; 3)

b) P(2; 5), Q(9; 3), R(5; 9) and P′(13⁄2; 7), Q′(10; 6), R′(8; 9)

c) P(1; 2), Q(13; 2), R(1; 10) and P′(6; 6), Q′(12; 6), R′(6; 10)

Q-32 **Solve:**

a) Show that the sides of rectangles ABCD and PQRS are in the ratio 2 : 3.

b) Show that the areas of the rectangles are in the ratio 4 : 9.

Q-33 **Solve:**

a) Show that the sides of these two cuboids are in the ratio 3 : 4.

b) Show that their volumes are in the ratio 27 : 64.

Q-34 **Find the ratio of the area of these pairs of similar triangles.**

a)

b)

Q-35 **The ratio of the areas of two circles is 16 : 9. If the diameter of the larger circle is 8 cm, what is the area of the smaller circle?**

Q-36 **Two cylinders, A and B, are similar. The base area of A is half the base area of B. If the base area of B is 100 cm², what is the base area of A?**

Q-37 **X and Y are two similar cylinders. The radius of the base of X is half the radius of the base of Y, and the height of X is half the height of Y. What is the ratio of their volumes?**

Q-38 **The sides of two squares measure 14 cm and 8 cm, respectively. Write in the simplest form:**

a) the ratio of the lengths of their sides

b) the ratio of their areas

Q-39 **The plan of a house is drawn to scale, with 2 cm on the plan representing 1 m on land.**

a) A wall on the plan measures 6 cm. Find its actual length.

b) Determine the actual length represented on the plan by 60 cm.

c) A rectangular room on the plan measures 14 cm by 8 cm. Find the actual area of the room.

Q-40 **Two circles are such that one has a radius of 8 cm and the other has a diameter of 24 cm. Write in the simplest form:**

a) the ratio of the radii

b) the ratio of the areas of the circles.

Q-41 **Two similar jars have heights of 16 cm and 12 cm, respectively. Given that the smaller jar holds 0.81 litres when full, find the capacity of the larger jar when full.**

Q-42 **Two rubber balls have diameters of 3 cm and 5 cm, respectively. Find in its simplest form:**

a) the ratio of their volumes

b) the ratio of their surface areas.

Q-43 **A pole with height 1 m casts a shadow with length 3 m. At the same time, what is the length of the shadow of a similar pole with height 3 m?**

Q-44 **A boy who is 1.5 m tall, stands 2 m from a street light and casts a shadow of length 2 m. What is the height above the ground of the street light?**

Q-45 **A ladder rests with one end on the ground and the other end on a vertical wall that is 4.5 m high. A vertical pole with length 1.5 m is placed under the ladder at a distance of 2 m from the wall. Find the distance of the pole from the foot of the ladder.**

Q-46 **A scale model of the school auditorium is made in the form of a cuboid, using a scale of 1 : 120. The size of the auditorium is 60 m by 42 m and it is 10.8 m high. Calculate:**

a) the length, breadth and height of the model

b) the area of the floor of the model

c) the volume of the model

d) the ratio volume of model / volume of auditorium .

Q-47 **If the two triangles are similar, find the tower's height from the given measurements alongside.**

Q-48 **Consider the triangles in the figure below:**

a) Are the two triangles similar?

b) What is the length of QT?

c) If PT is 15 cm, what is the length of RT?

Q-49 **Adaoma is 1.3 m tall. She stands 7 m in front of a tree and casts a shadow 1.8 m long. How tall is the tree?**

Q-50 **Ifetundun casts a shadow of 1.2 m and she is 1.8 m tall. A building casts a shadow of 10 m at the same time that Ifetundun measured her shadow. Draw a diagram of this situation, and then calculate the building's height.**

Q-51 **Thales of Miletus (625 to 547 BC) was a Greek philosopher who travelled to Egypt. While there, the king of Egypt asked Thales to find out the height of a pyramid. He waited for the time of day when the shadow of his stick was as long as the stick was tall. He then measured the length of the shadow of the pyramid, which was of course, equal to its height. ∆ABC is formed by the height of the pyramid, half the length of the pyramid and its shadow. ∆DEC is formed by Thale's staff and the shadow cast by the staff. Calculate the height of the pyramid, AB, if:**

a) the base of the pyramid is 230 m

b) the length of its shadow, FC, is 95 m

c) the length of Thales' staff is 2 m

d) the length of its shadow is 3 m

Q-52 **∆IJK and ∆TUV are similar. The length of the sides of ∆IJK are 40, 50, and 24 units. If the length of the longest side of ∆TUV is 275 units, what is the perimeter of ∆TUV?**

Q-53 **Iyawa wants to measure the height of a nearby flagpole using a mirror as shown in the diagram. The mirror is 6 m away from the flagpole and 2 m away from Iyawa. The height to her eyes is 1.57 m from which she can clearly see the top of the flagpole. How tall is the flagpole in centimetres?**

Q-54 **Ndudioso wants to cross a river. To determine the width of the river, he locates a tree at Point A across the river. He marks the spot and then walks 28 m to Point C. He marks Point C and walks an additional 10 m before turning perpendicular to the river and walking until Point C lines up with Point A. This distance is 14 m. What is the width of the river in metres?**

Chapter-19 Term 3 Construction

Q-1 **A square has a side 5 cm long. Find its area.**

Q-2 **A square has an area of 81 m². Find the length of its sides.**

Q-3 **A square has an area of 16 mm². How many squares of area 4 mm² can fit inside it?**

Q-4 **The sides of a square is 5 cm. If its side is doubled, how many times is the area of the new square larger than the area of the old square?**

Q-5 **Draw any rectangle in each grid with the following area.**

a) Area = 10 square units

b) Area = 12 square units

c) Area = 25 square units

Q-6 **Find the area of each rectangle.**

a)

b)

c)

d)

Q-7 **Calculate the area of a rectangle which has a length of 15 cm and a breadth of 9.6 cm.**

Q-8 **The area of a rectangular floor is 840 m^2. Given that the length of the floor is 35 m, find the breadth.**

Q-9 **Calculate the area of a square with sides 7.2 cm.**

Q-10 **A cornfield has an area of 0.0036 km^2. Express this area in square metres.**

Q-11 **A football field is a rectangle with length 160 m and breadth 120 m. Calculate its area in:**

a) square metres

b) hectares.

Q-12 **Find the area of the shaded portion in the figure below.**

Q-13 **You are given the base or height of each triangle. Indicate the height or base in each case.**

a)

b)

c)

Q-14 **Find the area of each of these triangles.**

a)

b)

c)

d)

Q-15 **The area of a triangle is 24 cm². Given that the height of the triangle is 6 cm, find the length of the base of the triangle.**

Q-16 **The length of the base and the height of a triangle are equal. Given that the area of the triangle is 24.5 cm², find the height of the triangle.**

Q-17 **In the diagram below, AB = 15 mm, BC = 12 mm and CD = 40 mm.**

a) Find the length of AC.

b) Find the area of ■ABD.

Q-18 **Find the area of the triangle.**

Q-19 **Find the area of the shaded region in the shape on the side.**

Q-20 **Find the areas of the following parallelograms.**

a)

b)

c)

d)

e)

Q-21 **Calculate the area of these parallelograms.**

a)

b)

c)

d)

Q-22 **The area of a parallelogram is 90 cm². Given that the length of the base of the parallelogram is 15 cm, find the perpendicular distance between the bases.**

Q-23 **The length of the base of a parallelogram is equal to the perpendicular distance between the parallel sides. If the area of the parallelogram is 324 cm², calculate the length of the base.**

Q-24 **Find the size of the shaded area.**

Q-25 **Find the area of each of these trapeziums.**

a)

b)

c)

d)

e)

f)

Q-26 **Given trapezium ABCE.**

a) Calculate CD.

b) Calculate the area of trapezium ABCE.

Q-27 **The rectangle and trapezium have the same area. What is the length (l) of the rectangle?**

Q-28 **A trapezium has an area of 30 cm². The lengths of the sides are 2.3 cm and 7.7 cm respectively. Find the height of the trapezium.**

Q-29 **Draw any closed shape in each grid with the following perimeters.**

a) Perimeter = 22 units

b) Perimeter = 30 units

c) Perimeter = 14 units

Q-30 **Find the perimeter of each of these figures.**

a)

b)

Q-31 **The perimeter of a square is 64 m. Find its length.**

Q-32 **The perimeter of a triangle is 164 m. If two of its sides are 84 m and 40 m long, find the length of the third side.**

Q-33 **Find the perimeter and area of kite ABCD.**

Q-34 **Given that the perimeter of the trapezium ABCE is 36 cm, find the perimeter of ■CDE.**

Q-35 **Find the perimeter of each of these shapes.**

a)

b)

c)

d)

Q-36 **First find the missing length(s). Then find the perimeter of the shapes.**

a)

b)

c)

d)

Q-37 **Copy and complete the table below for rectangles.**

a)

b)

c)

d)

e)

f)

g)

h)

Q-38 **Copy and complete the table below.**

Q-39 **Draw a circle and label:**

a) the lines

b) the regions.

Q-40 **Copy and complete the table on the right.**

Q-41 **Find the area of the following shapes.**

a)

b)

c)

Q-42 **Given that the circumference of a circle is 22 m, find the area of the circle.**

Q-43 **A bicycle wheel makes 100 revolutions to cover a distance of 13 200 cm. What is the radius of the wheel?**

Q-44 **Calculate the area of the shaded region.**

a)

b)

c)

Q-45 **Find the area of each of these sectors. Take π as 22/7.**

a)

b)

c)

d)

Q-46 **Taking π as 22/7, calculate the area of the shaded region.**

Q-47 **The diagram shows a quadrant OAB of a circle with centre O and radius 14 cm. Calculate the area of the shaded region.**

Q-48 **A circle has a radius of $\sqrt{21}$ cm. Calculate the angle the sector subtends at the centre when the area of the sector is 22 cm². Take π as 22/7.**

Q-49 **Given that OA = 5 cm and $A\hat{O}B = 90°$ (where O is the centre of the circle), calculate:**

a) the arc length AB

b) the area of minor sector AOB.

Q-50 **Find the areas of these figures. All dimensions are in cm.**

a)

b)

Q-51 **A rectangle has an area of 119 cm² and a breadth of 8 cm. Find its length.**

Q-52 **A circle has an area of 450 cm². Find the radius of the circle (take π as 3.14).**

Q-53 **Find the area of a circular path of 2 m wide that surrounds a circular flower bed of radius 8 m.**

Q-54 **Imbiana is ordering new carpet for her L-shaped living room. What is the area of the living room?**

Q-55 **A shape is cut from a sheet of cardboard. The shape is shown in the diagram below. What is the area of the shape?**

Q-56 **Kufreabasi is painting a mural. The background is slanted stripes, as shown on the right. To buy paint, she must know how many square metres she will be covering. What is the area of one stripe?**

Q-57 **Consider circle AB with centre O.**

a) Calculate the length of the minor arc AB.

b) Calculate the area of the major sector.

c) Calculate the percentage area of the circle that the major sector covers.

Q-58 **The pendulum of a clock swings between 5 and 7, forming an acute angle.**

a) What is the size of the acute angle it forms?

b) If the length of the pendulum is 25 cm, calculate the length of the arc that is formed.

Q-59 **The Delicious Ice Cream shop has a sign of an ice cream cone outside its entrance. It is represented in the diagram below. The sign consists of an isosceles triangle with height 8 cm and a semi-circle with a diameter of 10 cm. Find the area of the entire shape.**

Q-60 **Kola had a circle which was marked with 12 numbered dots to help him draw clock faces. The circle has a diameter of 10 cm. Kola drew lines from the 12 to the 3, from the 3 to the 6, from the 6 to the 9 and then back from the 9 to the 12. Find the area of the shaded region.**