



# TNPSC CTSE-ITI

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## WORKSHOP CALCULATION SCIENCE

**CODE: 540**

**UNIT  
WISE  
MCQ  
QUESTIONS  
WITH  
ANSWER  
EXPLANATION**

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ANSWER

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QUESTION

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**UNIT 01: UNITS, FRACTION, SQUARE ROOT, RATIO, PROPORTION  
AND PERCENTAGE**

**QUESTION**

Q1. Which of the following is a derived SI unit?

- A) Kilogram
- B) Meter
- C) Newton
- D) Ampere

Q2. Convert 72 km/h to m/s.

- A) 20 m/s
- B) 72/3.6 m/s
- C) 25 m/s
- D) 5 m/s

Q3. Find the HCF of 48, 60 and 96.

- A) 24
- B) 12
- C) 6
- D) 48

Q4. Add:  $4/7 + 2/3$

- A)  $6/10$
- B)  $2/5$
- C)  $26/21$
- D)  $8/9$

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Q5. Find the square root of 1156.

- A) 32
- B) 34
- C) 38
- D) 36

Q6. A ladder is 13 m long and reaches 5 m above the ground on a wall. How far is the foot of the ladder from the wall?

- A) 10
- B) 12 m





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**UNIT 01: UNITS, FRACTION, SQUARE ROOT, RATIO, PROPORTION  
AND PERCENTAGE**

**ANSWER AND EXPLANATION**

Q1. Which of the following is a derived SI unit?

- A) Kilogram
- B) Meter
- C) Newton
- D) Ampere

**Answer: C**

**Explanation:** Newton is a derived unit of force ( $\text{kg} \cdot \text{m}/\text{s}^2$ ), whereas others are fundamental.

Q2. Convert 72 km/h to m/s.

- A) 20 m/s
- B) 72/3.6 m/s
- C) 25 m/s
- D) 5 m/s

**Answer: B**

**Explanation:** Divide km/h by 3.6 to convert to m/s  $\rightarrow 72 \div 3.6 = 20 \text{ m/s}$ .

Q3. Find the HCF of 48, 60 and 96.

- A) 24
- B) 12
- C) 6
- D) 48

**Answer: B**

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**Explanation:** HCF of 48, 60 and 96 = 12 (common factor of all three numbers).

Q4. Add:  $4/7 + 2/3$

- A) 6/10
- B) 2/5
- C) 26/21
- D) 8/9

**Answer: C**

**Explanation:** LCM = 21,  $(12 + 14)/21 = 26/21$





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**UNIT 02: MATERIAL SCIENCE AND HEAT TREATMENT**

**QUESTION**

Q1. Which of the following is a ferrous metal?

- A) Aluminium
- B) Copper
- C) Steel
- D) Titanium

Q2. Cast iron has high carbon content and exhibits:

- A) High ductility
- B) Excellent toughness
- C) Good compressive strength and poor tensile strength
- D) High malleability

Q3. The main mechanical property improved in alloy steel over carbon steel is:

- A) Density
- B) Electrical conductivity
- C) Toughness and strength at high temperature
- D) Magnetic permeability

Q4. Which property primarily distinguishes iron from steel?

- A) Hardness
- B) Magnetic nature
- C) Carbon content and tunable properties
- D) Appearance

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Q5. Bars of structural steel often undergo normalizing to:

- A) Obtain martensite
- B) Increase internal stresses
- C) Refine grain structure uniformly
- D) Produce annealed softness

Q6. Annealing differs from hardening in that annealing:

- A) Uses quenching
- B) Produces more martensite
- C) Softens material, relieves stress, and improves ductility





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**UNIT 02: MATERIAL SCIENCE AND HEAT TREATMENT**

**ANSWER AND EXPLANATION**

Q1. Which of the following is a ferrous metal?

- A) Aluminium
- B) Copper
- C) Steel
- D) Titanium

**Answer: C**

**Explanation: Steel contains iron; ferrous metals are iron-based alloys.**

Q2. Cast iron has high carbon content and exhibits:

- A) High ductility
- B) Excellent toughness
- C) Good compressive strength and poor tensile strength
- D) High malleability

**Answer: C**

**Explanation: Cast iron is brittle in tension, strong in compression.**

Q3. The main mechanical property improved in alloy steel over carbon steel is:

- A) Density
- B) Electrical conductivity
- C) Toughness and strength at high temperature
- D) Magnetic permeability

**Answer: C**

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**Explanation: Alloying elements (Ni, Cr, Mo) enhance strength & corrosion resistance.**

Q4. Which property primarily distinguishes iron from steel?

- A) Hardness
- B) Magnetic nature
- C) Carbon content and tunable properties
- D) Appearance

**Answer: C**

**Explanation: Steel has controlled carbon (<2%) giving higher strength and toughness.**





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**UNIT 03: MASS, WEIGHT, VOLUME, DENSITY, SPEED, VELOCITY  
AND WORK POWER ENERGY**

**QUESTION**

Q1. A metal cube has a mass of 250 grams and a volume of 50 cm<sup>3</sup>. What is its density?

- A) 5 g/cm<sup>3</sup>
- B) 0.2 g/cm<sup>3</sup>
- C) 12.5 g/cm<sup>3</sup>
- D) 2.5 g/cm<sup>3</sup>

Q2. If the weight of an object on Earth is 98 N, what is its mass? (Assume  $g = 9.8 \text{ m/s}^2$ )

- A) 10 kg
- B) 9.8 kg
- C) 98 kg
- D) 0.98 kg

Q3. A liquid has a density of 1.2 g/cm<sup>3</sup>. What is its specific gravity?

- A) 1.2
- B) 0.12
- C) 12
- D) 0.012

Q4. An object weighs 30 N on Earth. What would be its weight on the Moon where gravity is 1/6th of Earth's?

- A) 5 N
- B) 6 N

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- C) 180 N
- D) 25 N

Q5. Which of the following quantities is scalar?

- A) Weight
- B) Velocity
- C) Acceleration
- D) Mass

Q6.  travels 100 km in 2 hours. What is its average speed? <

- A) 50 km/h



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Q1. A metal cube has a mass of 250 grams and a volume of 50 cm<sup>3</sup>. What is its density?

- A) 5 g/cm<sup>3</sup>
- B) 0.2 g/cm<sup>3</sup>
- C) 12.5 g/cm<sup>3</sup>
- D) 2.5 g/cm<sup>3</sup>

**Answer: A**

**Explanation: Density = Mass / Volume = 250 g / 50 cm<sup>3</sup> = 5 g/cm<sup>3</sup>.**

Q2. If the weight of an object on Earth is 98 N, what is its mass? (Assume g = 9.8 m/s<sup>2</sup>)

- A) 10 kg
- B) 9.8 kg
- C) 98 kg
- D) 0.98 kg

**Answer: A**

**Explanation: Weight = Mass × g ⇒ Mass = Weight / g = 98 N / 9.8 m/s<sup>2</sup> = 10 kg.**

Q3. A liquid has a density of 1.2 g/cm<sup>3</sup>. What is its specific gravity?

- A) 1.2
- B) 0.12
- C) 12
- D) 0.012

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**Answer: A**

**Explanation: Specific gravity = Density of substance / Density of water = 1.2 / 1 = 1.2.**

Q4. An object weighs 30 N on Earth. What would be its weight on the Moon where gravity is 1/6th of Earth's?

- A) 5 N
- B) 6 N
- C) 180 N
- D) 25 N

**Answer: B**

**Explanation: Weight on Moon = Weight on Earth × (1/6) = 30 N × (1/6) = 5 N**





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**UNIT 04: HEAT AND TEMPERATURE**

**QUESTION**

**Q1. Which of the following statements correctly distinguishes between heat and temperature?**

- A) Heat is a measure of the average kinetic energy of particles; temperature is the total energy.
- B) Heat is energy in transit due to temperature difference; temperature is a measure of thermal energy.
- C) Heat is measured in Kelvin; temperature is measured in Joules.
- D) Heat can be negative; temperature cannot.

**Q2. Which instrument is used to measure the temperature of a furnace without direct contact?**

- A) Thermocouple
- B) Mercury thermometer
- C) Pyrometer
- D) Manometer

**Q3. What is the primary mode of heat transfer in solids?**

- A) Convection
- B) Radiation
- C) Conduction
- D) Evaporation

**Q4. Which of the following materials has the highest thermal conductivity?**

- A) Copper
- B) Aluminum

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- C) Silver
- D) Diamond

**Q5. What is the coefficient of linear expansion?**

- A) Change in volume per unit temperature change.
- B) Change in area per unit temperature change.
- C) Change in length per unit length per degree temperature change.
- D) Change in mass per unit temperature change.

**Q6. Which metal has the highest melting point?**

- A) Iron





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### UNIT 04: HEAT AND TEMPERATURE

#### ANSWER AND EXPLANATION

**Q1.** Which of the following statements correctly distinguishes between heat and temperature?

- A) Heat is a measure of the average kinetic energy of particles; temperature is the total energy.
- B) Heat is energy in transit due to temperature difference; temperature is a measure of thermal energy.
- C) Heat is measured in Kelvin; temperature is measured in Joules.
- D) Heat can be negative; temperature cannot.

**Answer: B**

**Explanation:** Heat refers to the energy transferred between systems due to a temperature difference, whereas temperature measures the thermal energy within a system.

**Q2.** Which instrument is used to measure the temperature of a furnace without direct contact?

- A) Thermocouple
- B) Mercury thermometer
- C) Pyrometer
- D) Manometer

**Answer: C**

**Explanation:** A pyrometer measures high temperatures from a distance by detecting thermal radiation, making it suitable for furnaces.

**Q3.** What is the primary mode of heat transfer in solids?

- A) Convection
- B) Radiation

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- C) Conduction
- D) Evaporation

**Answer: C**

**Explanation:** In solids, heat is primarily transferred through conduction, where energy is passed between adjacent particles.

**Q4.** Which of the following materials has the highest thermal conductivity

- A) Copper
- B) Aluminum
- C) Silver
- D) Diamond





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**UNIT V: BASIC ELECTRICITY**

**QUESTION**

Q1. Which of the following is a unit of electric current?

- A) Ohm
- B) Watt
- C) Ampere
- D) Volt

Q2. The primary difference between AC and DC is:

- A) AC flows only in one direction
- B) DC flows in both directions
- C) AC reverses direction periodically
- D) DC has more voltage than AC

Q3. Which material is a good electrical conductor?

- A) Glass
- B) Rubber
- C) Copper
- D) Plastic

Q4. What is the SI unit of resistance?

- A) Ampere
- B) Ohm
- C) Watt
- D) Henry

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Q5. In Ohm's Law,  $V = IR$ . What does "R" stand for?

- A) Reactance
- B) Resistance
- C) Rotation
- D) Rectifier

Q6. Which device is used to convert AC to DC?

- A) Transformer
- B) Inverter
- C) Rectifier
- D) Resistor





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### UNIT V: BASIC ELECTRICITY

#### ANSWER AND EXPLANATION

Q1. Which of the following is a unit of electric current?

- A) Ohm
- B) Watt
- C) Ampere
- D) Volt

**Answer: C**

**Explanation: Ampere (A) is the SI unit of electric current.**

Q2. The primary difference between AC and DC is:

- A) AC flows only in one direction
- B) DC flows in both directions
- C) AC reverses direction periodically
- D) DC has more voltage than AC

**Answer: C**

**Explanation: AC (alternating current) changes direction periodically; DC flows in one direction.**

Q3. Which material is a good electrical conductor?

- A) Glass
- B) Rubber
- C) Copper
- D) Plastic

**Answer: C**

**Explanation: Copper has low resistance, making it ideal for conduction.**

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Q4. What is the SI unit of resistance?

- A) Ampere
- B) Ohm
- C) Watt
- D) Henry

**Answer: B**

**Explanation: Resistance is measured in ohms ( $\Omega$ ).**

Q5. Ohm's Law,  $V = IR$ . What does "R" stand for?

- A) Reactance





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**UNIT 06: MENSURATION – AREA OF CUT-OUT REGULAR AND IRREGULAR SURFACES**

**QUESTION**

Q1. A square has a perimeter of 48 cm. What is its area?

- A) 144 cm<sup>2</sup>
- B) 196 cm<sup>2</sup>
- C) 256 cm<sup>2</sup>
- D) 576 cm<sup>2</sup>

Q2. A rectangle has a length of 15 cm and a width of 10 cm. What is its area?

- A) 150 cm<sup>2</sup>
- B) 125 cm<sup>2</sup>
- C) 100 cm<sup>2</sup>
- D) 200 cm<sup>2</sup>

Q3. The area of a parallelogram is 120 cm<sup>2</sup>, and its base is 10 cm. What is its height?

- A) 10 cm
- B) 12 cm
- C) 15 cm
- D) 20 cm

Q4. A triangle has a base of 8 cm and a height of 5 cm. What is its area?

- A) 20 cm<sup>2</sup>
- B) 30 cm<sup>2</sup>
- C) 40 cm<sup>2</sup>

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D) 50 cm<sup>2</sup>

Q5. The radius of a circle is 7 cm. What is its area? (Use  $\pi = 22/7$ )

- A) 154 cm<sup>2</sup>
- B) 144 cm<sup>2</sup>
- C) 164 cm<sup>2</sup>
- D) 134 cm<sup>2</sup>

Q6. The diameter of a semicircle is 14 cm. What is its area? (Use  $\pi = 22/7$ )

- A) 
- B) 154 cm<sup>2</sup>





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**ANSWER AND EXPLANATION**

Q1. A square has a perimeter of 48 cm. What is its area?

- A) 144 cm<sup>2</sup>
- B) 196 cm<sup>2</sup>
- C) 256 cm<sup>2</sup>
- D) 576 cm<sup>2</sup>

**Answer: A**

**Explanation: Perimeter of a square = 4 × side**

**So, side = 48 cm / 4 = 12 cm**

**Area = side<sup>2</sup> = 12<sup>2</sup> = 144 cm<sup>2</sup>**

Q2. A rectangle has a length of 15 cm and a width of 10 cm. What is its area?

- A) 150 cm<sup>2</sup>
- B) 125 cm<sup>2</sup>
- C) 100 cm<sup>2</sup>
- D) 200 cm<sup>2</sup>

**Answer: A**

**Explanation: Area = length × width = 15 cm × 10 cm = 150 cm<sup>2</sup>**

Q3. The area of a parallelogram is 120 cm<sup>2</sup>, and its base is 10 cm. What is its height?

- A) 10 cm
- B) 12 cm
- C) 15 cm

D) 20 cm

**Answer: B**

**Explanation: Area = base × height**

**So, height = Area / base = 120 cm<sup>2</sup> / 10 cm = 12 cm**

Q4. A triangle has a base of 8 cm and a height of 5 cm. What is its area?

- A) 20 cm<sup>2</sup>
- B) 30 cm<sup>2</sup>
- C) 40 cm<sup>2</sup>
- D) 50 cm<sup>2</sup>

**Answer: C**

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D) 20 cm

**Answer: B**

**Explanation: Area = base × height**

**So, height = Area / base = 120 cm<sup>2</sup> / 10 cm = 12 cm**

Q4. A triangle has a base of 8 cm and a height of 5 cm. What is its area?

- A) 20 cm<sup>2</sup>
- B) 30 cm<sup>2</sup>
- C) 40 cm<sup>2</sup>
- D) 50 cm<sup>2</sup>

**Answer: C**





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**UNIT: 07 FRICTION****QUESTION**

Q1. What is friction?

- A) Resistance to motion between two surfaces
- B) Force that increases speed
- C) Energy conversion in motion
- D) None of the above

Q2. Which one is not an advantage of friction?

- A) Enables walking
- B) Helps in braking
- C) Produces heat in machines
- D) Aids in holding tools

Q3. Which law of friction states that the force of friction is proportional to the normal force?

- A) First law
- B) Second law
- C) Third law
- D) Coulomb's law

Q4. The coefficient of friction ( $\mu$ ) is defined as:

- A) Ratio of normal force to frictional force
- B) Product of normal force and frictional force
- C) Ratio of frictional force to normal force
- D) Difference between normal force and frictional force

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Q5. What is the unit of coefficient of friction?

- A) Newton
- B) No unit
- C) Joule
- D) Pascal

Q6. Which of the following factors does not affect the force of friction between two surfaces?

- A) Nature of the surfaces
- B) Area of contact





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**UNIT: 07 FRICTION**

**ANSWER AND EXPLANATION**

Q1. What is friction?

- A) Resistance to motion between two surfaces
- B) Force that increases speed
- C) Energy conversion in motion
- D) None of the above

**Answer: A**

**Explanation:** Friction is a resistive force that occurs when two surfaces move or try to move across each other.

Q2. Which one is not an advantage of friction?

- A) Enables walking
- B) Helps in braking
- C) Produces heat in machines
- D) Aids in holding tools

**Answer: C**

**Explanation:** Heat generation is a disadvantage of friction as it leads to energy loss and wear.

Q3. Which law of friction states that the force of friction is proportional to the normal force?

- A) First law
- B) Second law
- C) Third law
- D) Coulomb's law

**Answer: B**

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**Explanation:** The second law of friction states that frictional force is directly proportional to the normal reaction force.

Q4. The coefficient of friction ( $\mu$ ) is defined as:

- A) Ratio of normal force to frictional force
- B) Product of normal force and frictional force
- C) Ratio of frictional force to normal force
- D) Difference between normal force and frictional force

**Answer: C**

**Explanation:**  $\mu = \text{Frictional force} / \text{Normal force}$



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UNIT 08: CENTRE OF GRAVITY, LEVERS AND SIMPLE MACHINES  
AND ELASTICITY

QUESTION

**Q1.** The center of gravity of a uniform semicircular lamina lies at a distance of:

A)  $r/2$  from the center along the axis  
 B)  $4r/3\pi$  from the center along the axis  
 C)  $2r/\pi$  from the center along the axis  
 D)  $3r/4$  from the center along the axis

**Q2.** Which of the following statements is true regarding the center of gravity?

A) It always lies within the material body  
 B) It coincides with the centroid for homogeneous bodies  
 C) It is affected by the orientation of the body  
 D) It depends on the shape but not the mass distribution

**Q3.** The center of gravity of a composite body can be found by:

A) Averaging the centers of gravity of individual parts  
 B) Using the principle of moments  
 C) Considering only the largest part  
 D) Ignoring the mass distribution

**Q4.** For a uniform solid cone, the center of gravity lies at a distance of:

A)  $h/4$  from the base  
 B)  $h/3$  from the base  
 C)  $3h/4$  from the base

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D)  $2h/3$  from the base

**Q5.** The center of gravity of a uniform thin rod of length L is located at:

A) One-fourth from one end  
 B) Midpoint of the rod  
 C) Three-fourths from one end  
 D) At one end

**Q6.** In a first-class lever, the fulcrum is located:

A) Between the effort and the load 

B) At the end of the lever





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AND ELASTICITY**

**ANSWER AND EXPLANATION**

Q1. The center of gravity of a uniform semicircular lamina lies at a distance of:

- A)  $r/2$  from the center along the axis
- B)  $4r/3\pi$  from the center along the axis
- C)  $2r/\pi$  from the center along the axis
- D)  $3r/4$  from the center along the axis

**Answer: B**

**Explanation:** For a semicircular lamina, the center of gravity lies at a distance of  $4r/3\pi$  from the center along the axis perpendicular to the diameter.

Q2. Which of the following statements is true regarding the center of gravity?

- A) It always lies within the material body
- B) It coincides with the centroid for homogeneous bodies
- C) It is affected by the orientation of the body
- D) It depends on the shape but not the mass distribution

**Answer: B**

**Explanation:** For homogeneous bodies, the center of gravity coincides with the centroid, which is the geometric center of the body.

Q3. The center of gravity of a composite body can be found by:

- A) Averaging the centers of gravity of individual parts
- B) Using the principle of moments
- C) Considering only the largest part

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D) Ignoring the mass distribution

**Answer: B**

**Explanation:** The center of gravity of a composite body is determined by taking moments of individual parts about a reference axis and dividing the sum of moments by the total mass.

Q4. For a uniform solid cone, the center of gravity lies at a distance of:

- A)  $h/4$  from the base
- B)  $h/3$  from the base
- C)  $3h/4$  from the base
- D)  $2h/3$  from the base

**Answer: D**





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**UNIT 09: ALGEBRA & TRIGONOMETRY**

**ANSWER AND EXPLANATION**

Q1. What is the value of  $(a + b)^2 - (a - b)^2$ ?

- A)  $2ab$
- B)  $4ab$
- C)  $a^2 + b^2$
- D)  $a^2 - b^2$

**Answer: B**

**Explanation:**  $(a + b)^2 - (a - b)^2 = a^2 + 2ab + b^2 - (a^2 - 2ab + b^2) = 4ab$

Q2. Simplify:  $3x(2x - 5) - 4x(3x + 1)$

- A)  $-6x^2 - 19x$
- B)  $-6x^2 - 13x$
- C)  $6x^2 - 19x$
- D)  $-6x^2 + 13x$

**Answer: B**

**Explanation:**  $3x(2x - 5) = 6x^2 - 15x$

$4x(3x + 1) = 12x^2 + 4x$

Now,  $6x^2 - 15x - 12x^2 - 4x = -6x^2 - 19x$

Q3. If  $x^2 - 5x + 6 = 0$ , then the value of x is:

- A) 2, 3
- B) -2, -3
- C) 1, 6
- D) 3, -2

**Answer: A**

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**Explanation:** Factoring:  $x^2 - 5x + 6 = (x - 2)(x - 3) \Rightarrow x = 2, 3$

Q4. The value of  $81^{1/4}$  is:

- A) 2
- B) 3
- C) 9
- D) 4

**Answer: B**

**Explanation:**  $81 = 3^4 \Rightarrow 81^{1/4} = (3^4)^{1/4} = 3$

Q5. Which is a correct identity?





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**UNIT 10: ESTIMATION AND COSTING, PROFIT AND LOSS**

**QUESTION**

**Q1. What is the term used for the method of calculating various quantities and expenditure on a particular job or process?**

- A) Estimation
- B) Drawing
- C) Specification
- D) Plan

**Q2. Which authority publishes the schedule of rates used in estimation?**

- A) Individual
- B) Corporate
- C) Partnership firm
- D) Government department

**Q3. What is the main factor to be considered while preparing a detailed estimate?**

- A) Shape of material
- B) Brand of the materials
- C) Quantity, availability, and transportation of materials
- D) Location of material

**Q4. What is the term for an estimate that falls short of the actual expenditure?**

- A) Overestimate
- B) Underestimate
- C) Accurate estimate

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D) Revised estimate

**Q5. What is the most reliable type of estimate?**

- A) Preliminary estimate
- B) Plinth area estimate
- C) Cube rate estimate
- D) Detailed estimate

**Q6. Alfred buys an old scooter for Rs. 4,700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5,900, his gain percent is:**

- A) 4.4%





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**UNIT 10: ESTIMATION AND COSTING, PROFIT AND LOSS**

**ANSWER AND EXPLANATION**

Q1. What is the term used for the method of calculating various quantities and expenditure on a particular job or process?

- A) Estimation
- B) Drawing
- C) Specification
- D) Plan

**Answer: A**

**Explanation: Estimation involves calculating the quantities and costs required for a specific job or process.**

Q2. Which authority publishes the schedule of rates used in estimation?

- A) Individual
- B) Corporate
- C) Partnership firm
- D) Government department

**Answer: D**

**Explanation: Government departments publish the schedule of rates, which are standardized rates for various items of work.**

Q3. What is the main factor to be considered while preparing a detailed estimate?

- A) Shape of material
- B) Brand of the materials
- C) Quantity, availability, and transportation of materials
- D) Location of material

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**Answer: C**

**Explanation: Accurate estimation requires considering the quantity, availability, and transportation costs of materials.**

Q4. What is the term for an estimate that falls short of the actual expenditure?

- A) Overestimate
- B) Underestimate
- C) Accurate estimate
- D) Revised estimate

**Answer: B**

**Explanation: An underestimate occurs when the estimated cost is less than**

