Officer Aptitude Rating (OAR) Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. How does buoyancy change as you go deeper with an inflated ball?

A. It decreases, making the ball easier to hold down

B. It remains the same regardless of depth

C. It increases, making the ball more buoyant

D. It decreases until a certain depth where it suddenly increases

2. What are the four strokes of a 4-stroke engine?

A. Intake, combustion, exhaust, refuel

B. Compression, intake, exhaust, ignition

C. Intake, compression, combustion, exhaust

D. Intake, ignition, discharge, exhaust

3. What is the definition of a vertex in geometry?

A. A point where two lines meet

B. The distance around a circle

C. A line that bisects an angle

D. An area enclosed by straight lines

4. What does increasing the diameter of a pipe typically do to fluid flow?

A. Increases flow resistance

B. Reduces flow speed

C. Increases flow speed

D. Has no effect on flow speed

5. How do you calculate the necessary RPM for a wheel based on projection rods?

A. Multiply the contacts per minute by rods

B. Divide the rods by contacts per minute

C. Subtract the rods from contacts per minute

D. Divide the contacts per minute by the number of rods

6. When multiplying fractions, what is the first step?

- **A. Multiply the denominators by each other**
- **B. Add the numerators**
- **C. Multiply the numerators by each other**
- **D. Find a common denominator**

7. How do you divide fractions?

- **A. Simply divide the numerators**
- **B. Invert the first fraction**
- **C. Invert the second fraction and change the division to multiplication**
- **D. Multiply both fractions together directly**

8. What is the volume formula for a rectangular solid?

- **A. pi * (r^2) * h**
- **B. lwh**
- **C. s^3**
- **D. 4/3 * pi * r^3**

9. For a triangle, which formula is used to calculate its area?

- **A. LW**
- **B. S^2**
- **C. BH**
- **D. BH/2**

10. What is the primary function of a sextant in navigation?

- **A. To measure time**
- **B. To determine speed**
- **C. To measure angles for celestial navigation**
- **D. To calculate distance**

Answers

1. C
2. C
3. A
4. B
5. D
6. C
7. C
8. B
9. D
10. C

Explanations

1. How does buoyancy change as you go deeper with an inflated ball?

A. It decreases, making the ball easier to hold down

B. It remains the same regardless of depth

C. It increases, making the ball more buoyant

D. It decreases until a certain depth where it suddenly increases

Buoyancy is the upward force exerted by a fluid, which can be affected by several factors, including depth in the fluid. In the case of an inflated ball submerged in water, buoyancy primarily depends on the volume of fluid displaced by the ball, according to Archimedes' principle. As you go deeper with the inflated ball, the pressure increases, which can compress the air inside the ball slightly, potentially reducing its volume. However, the amount of water displaced by the submerged part of the ball remains relatively constant, assuming the ball's inflation and external conditions do not significantly change. The correct answer states that buoyancy increases as you go deeper, which can be understood through the concept of effective volume displacement. While the ball can compress under increasing pressures at great depths, the increase in pressure does not instantly translate to a proportional increase in buoyancy. What is crucial is that as the volume of the ball remains sufficient to displace a considerable amount of water, the overall buoyant force acting on the ball remains effectively high, allowing it to be more buoyant than at shallower depths. In summary, deeper water increases the pressure on the ball and changes its volume slightly, but the key principle is that buoyancy, derived from how much

2. What are the four strokes of a 4-stroke engine?

A. Intake, combustion, exhaust, refuel

B. Compression, intake, exhaust, ignition

C. Intake, compression, combustion, exhaust

D. Intake, ignition, discharge, exhaust

The four strokes of a 4-stroke engine are intake, compression, combustion, and exhaust. During the intake stroke, the engine draws in the air-fuel mixture through the intake valve as the piston moves down in the cylinder. Next, in the compression stroke, the piston moves back up, compressing the mixture, which prepares it for efficient combustion. This is followed by the combustion stroke, where the spark plug ignites the compressed air-fuel mixture, causing a powerful explosion that pushes the piston down, creating the power needed to turn the engine. Finally, in the exhaust stroke, the piston moves back up again to push out the spent gases through the opened exhaust valve, allowing the cycle to start anew. The correct answer encompasses the entire cycle of a 4-stroke engine and highlights the process of converting fuel into useful mechanical energy, which is central to the operation of internal combustion engines.

3. What is the definition of a vertex in geometry?

A. A point where two lines meet

B. The distance around a circle

C. A line that bisects an angle

D. An area enclosed by straight lines

A vertex in geometry is defined as a point where two lines meet. This concept is fundamental in various geometric shapes, such as angles, polygons, and polyhedra. In the context of angles, the vertex is the point where the sides of the angle intersect. For polygons, such as triangles, squares, and pentagons, each corner or point where the edges of the shape converge is labeled as a vertex. This definition is crucial when analyzing the properties and relationships of geometric figures, as it helps in understanding their structure and the relationships between various angles and sides. The other options describe different geometric concepts. The distance around a circle refers to the circumference, which is a distinct geometric measure. A line that bisects an angle is known as an angle bisector, specifically serving to divide the angle into two equal parts. An area enclosed by straight lines describes a polygon, which is a closed figure formed by connecting straight line segments. Each of these concepts highlights different aspects of geometry but does not pertain to the definition of a vertex itself.

4. What does increasing the diameter of a pipe typically do to fluid flow?

A. Increases flow resistance

B. Reduces flow speed

C. Increases flow speed

D. Has no effect on flow speed

Increasing the diameter of a pipe typically leads to a reduction in flow speed. As the diameter increases, the cross-sectional area of the pipe also increases, allowing more fluid to flow through. According to the principle of continuity in fluid dynamics, if the flow rate (the amount of fluid passing through a section per unit time) remains constant, an increase in cross-sectional area results in a decrease in flow speed. This is because the same volume of fluid now has more space to occupy, so it moves slower. In practical terms, in a wider pipe, the fluid has a greater area to spread out, which naturally slows its velocity compared to that in a narrower pipe. It's important to note that while the flow speed decreases, the overall volume of fluid that can flow per unit time may increase, provided the pressure driving the fluid remains the same. The other choices do not align with the principles of fluid flow. Increasing flow resistance typically occurs with a decrease in diameter or with obstructions, while having no effect on flow speed contradicts the foundational concepts of fluid dynamics. As such, the assertion that increasing the diameter leads to reduced flow speed accurately reflects the behavior of fluids in varying pipe diameters.

5. How do you calculate the necessary RPM for a wheel based on projection rods?

A. Multiply the contacts per minute by rods

B. Divide the rods by contacts per minute

C. Subtract the rods from contacts per minute

D. Divide the contacts per minute by the number of rods

To determine the necessary RPM for a wheel based on projection rods, you divide the number of contacts per minute by the number of rods. This calculation allows you to find how many revolutions per minute are needed for the wheel to properly align with the projection rods, ensuring that each rod corresponds with a contact point on the wheel during its rotation. The rationale behind this approach is straightforward: if you know how many times the wheel needs to make contact per minute and you have a set number of rods, dividing these two figures provides the RPM needed for the system to function effectively. This way, each rod will be utilized appropriately by the contacts made by the wheel in a given minute, ensuring efficiency and accuracy in operations, such as in mechanical systems or machinery where precise timing is crucial.

6. When multiplying fractions, what is the first step?

A. Multiply the denominators by each other

B. Add the numerators

C. Multiply the numerators by each other

D. Find a common denominator

When multiplying fractions, the first step is to multiply the numerators by each other. This involves taking the top numbers of the fractions you are working with and calculating their product. For example, if you are multiplying the fractions 2/3 and 4/5, you would multiply 2 (from the first fraction) by 4 (from the second fraction), resulting in a numerator of 8. After this step, you would then proceed to multiply the denominators (the bottom numbers of the fractions). Continuing with the previous example, you would multiply 3 by 5 to get a denominator of 15. The final result after collecting both the numerator and denominator products would give you the new fraction. Other options do not represent the correct procedure for multiplying fractions. For instance, adding the numerators or finding a common denominator pertains to adding or comparing fractions, which is a different operation altogether. Multiplying the denominators by each other, while a necessary step in finding the final answer, is not the first action you take in the process.

7. How do you divide fractions?

A. Simply divide the numerators

B. Invert the first fraction

C. Invert the second fraction and change the division to multiplication

D. Multiply both fractions together directly

Dividing fractions involves a specific process that makes the operation straightforward. The correct method is to invert the second fraction, which means changing it to its reciprocal, and then changing the division operation to multiplication. This technique is based on the principle that dividing by a fraction is equivalent to multiplying by its reciprocal. For example, if you have a division problem like $\frac{a}{b} \div \frac{c}{d}$, you would take the second fraction $\frac{c}{d}$ and flip it to become $\frac{d}{c}$. The division would then transform into multiplication, so the operation becomes $\frac{a}{b} \times \frac{d}{c}$. This approach simplifies the calculation and leads to a correct result more efficiently than other methods. Understanding this division procedure is crucial for solving various mathematical problems involving fractions, making it an essential skill for the OAR test and other academic pursuits.

8. What is the volume formula for a rectangular solid?

A. pi * (r^2) * h

B. lwh

C. s^3

D. 4/3 * pi * r^3

The volume formula for a rectangular solid is represented by the equation that multiplies the length, width, and height of the solid. This formula is derived from the principles of geometry, where volume is expressed as the amount of space occupied by an object. In a rectangular solid, also known as a rectangular prism, the volume is calculated by taking the product of these three dimensions: length (l), width (w), and height (h). Therefore, the formula is l * w * h. This is a direct application of the measurements of the shape, allowing for a straightforward calculation of the total volume contained within the solid. Understanding this formula is essential because it applies to various real-world contexts, such as calculating the capacity of containers or the amount of material needed to fill a space.

9. For a triangle, which formula is used to calculate its area?

A. LW

B. S^2

C. BH

D. BH/2

The area of a triangle can be accurately calculated using the formula that incorporates both the base and the height of the triangle. The formula for the area is derived from the fact that a triangle can be thought of as half of a rectangle. In this case, when you multiply the base (B) of the triangle by its height (H), you obtain the area of a rectangle that encompasses the triangle. Since a triangle is only half of that rectangle, the area is computed as the product of the base and height divided by 2, giving the final formula as \(\frac{BH}{2}\). This formula applies universally regardless of the specific type of triangle, whether it is scalene, isosceles, or equilateral, so long as the base and corresponding height are known. This understanding is fundamental in geometry and allows for a consistent approach to determining the area of triangles in various contexts.

10. What is the primary function of a sextant in navigation?

A. To measure time

B. To determine speed

C. To measure angles for celestial navigation

D. To calculate distance

The primary function of a sextant in navigation is to measure angles for celestial navigation. It is an instrument that allows navigators to determine their position by measuring the angle between a celestial body (like the sun or a star) and the horizon. This angular measurement is crucial for calculating latitude and longitude, which are essential for determining one's location at sea. By using a sextant, navigators can accurately pinpoint their position over vast distances of open water, which is essential for safe and effective maritime travel. The other options, while related to navigation, do not accurately describe the specific role of a sextant: measuring time, determining speed, and calculating distance rely on different instruments and methods.