1. You measure water in a measuring cylinder. How should you read the scale?

   ☐ at the very top of the cylinder

   ☐ eye above, looking down at the water

   ☐ eye below, looking up at the water

   ☐ eye level with the bottom of the meniscus (the curved surface)

2. A runner covers 100 m in 8.0 s. What is the average speed, in m/s?

   _____ m/s

3. An astronaut travels from Earth to the Moon. What happens to their **mass** and **weight**?

   ☐ mass gets smaller; weight stays the same

   ☐ both get smaller by the same amount

   ☐ mass stays the same; weight gets smaller

   ☐ both stay the same

4. A force of 8.0 N stretches a spring by 0.040 m (within the limit of proportionality). What is the spring constant, in N/m?

   _____ N/m

5. Momentum is a vector.

   ☐ True ☐ False

6. Select **all** of these that are **energy stores**.

   ☐ kinetic

   ☐ loud

   ☐ gravitational potential

   ☐ chemical

   ☐ fast

   Tick every correct option.

7. A box pushes down with a force of 200 N over an area of 0.50 m^2. What is the pressure, in Pa?

   _____ Pa

8. A stack of 100 sheets of paper is 12 mm tall. How thick is one sheet, in mm?

   _____ mm

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_____ m/s^2

10. How do you find the volume of a small, oddly-shaped stone?

    ☐ heat it until it melts

    ☐ weigh it on a balance

    ☐ lower it into water in a measuring cylinder and read the rise in level

    ☐ measure its length with a ruler and cube it

1. **eye level with the bottom of the meniscus (the curved surface)**

   Read at the bottom of the meniscus with your eye level with it – looking from above or below gives a parallax error (a wrong reading).

2. **12.5 m/s**

   $v = \dfrac{s}{t} = \dfrac{100}{8.0} = 12.5$ m/s.

3. **mass stays the same; weight gets smaller**

   Mass (amount of matter) never changes. Weight is the force of gravity, and the Moon's gravity is weaker, so the weight is smaller.

4. **200 N/m**

   $k = \dfrac{F}{x} = \dfrac{8.0}{0.040} = 200$ N/m.

5. **True**

   Momentum is mass × velocity, and velocity has a direction, so momentum is a vector.

6. **kinetic; gravitational potential; chemical**

   Kinetic, chemical and gravitational potential are energy stores. "Loud" and "fast" describe things, but they are not energy stores.

7. **400 Pa**

   $p = \dfrac{F}{A} = \dfrac{200}{0.50} = 400$ Pa.

8. **0.12 mm**

   Measure many and divide: $12 \div 100 = 0.12$ mm. Dividing makes the small measurement much more accurate.

9. **5 m/s^2**

   $a = \dfrac{\Delta v}{\Delta t} = \dfrac{20 - 0}{4.0} = 5.0$ m/s^2.

10. **lower it into water in a measuring cylinder and read the rise in level**

    The stone pushes the water up. The rise in the water level equals the stone's volume – the displacement method.

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