Physics

1. State Newton's second law of motion.

2. One kilogram weighs 9.8 Newton's on Earth. Would it weigh more or less on the Moon?

3. Define the following

   i. Atom
   ii. Electron
   iii. Isotopes

4. State the law of the conservation of energy.

5. What net force does a sliding crate experience when you exert a force of 125 N and the friction between the crate and the floor is 115 N .

6. An aircraft flies 347 nm in 2.3 hrs. What is its average speed? (1dp)

7. Which has more momentum a 40 gm baseball moving at 25 m/s or a 1 kg bowling ball moving at 100 cm/s?

8. What happens to a car's Kinetic Energy if you double its velocity?

9. What is the rate at which energy is drained from a 12V battery connected to device running at 0.5 Amps?

10. How much current flows through a lamp with a resistance of 60Ω when the voltage across the lamp is 12V?

11. Calculate the work done moving an 800 kg aircraft 10 m using a 200 N force.

12. An electric razor completes 60cycles every second.

    a) What is its frequency?
    b) What is its period?

13. What is the approximate distance of a thunderstorm when you note a 3s delay between the flash of lightning and the sound of thunder?

14. What is the basic difference between a generator and an electric motor?

15. Calculate the total resistance of a circuit containing three resistances each of 6Ω connected in parallel.

16. Which will raise the temperature of water more, adding 4.18 joules or 1 calorie?

17. Calculate the resultant velocity of an airplane that normally flies at 200Km/h if it encounters a 50-Km/h wind from the side (at a right angle to the plane).

18. A body of mass 2 kg , initially moving with a velocity of 10m/s, collides with another body of mass 5 kg at rest. After the collision the velocity of first body becomes 1m/s. What is the velocity of second body?

19. Two pins A and B have tip areas 10^{-4} m^2 and 10^{-8} m^2. If a force of 10N is applied on each, find the pressure that is exerted on each pin.

20. A body of mass 5n kg initially at rest is subject to a force of 20N. What is the kinetic energy acquired by the body at the end of 10s?

Math

1. Calculate the value of R in the following equation:

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{5} + \frac{1}{20}$$

2. You have 240 passengers on your aircraft; 45% of them are male, 35% are female, and the rest are children. How many children are onboard the aircraft?

3. What is 4/9 of 3412? (1dp)

4. Evaluate $x = \sqrt{(4a - 4b)} - \frac{3(a - 6)}{2}$

   when a = 20 and b = 4

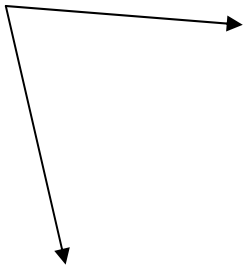
5. Arrange the following in descending order:

   8.11 8.01 8.101 8.1

6. Evaluate $\frac{3}{4} \div 1\frac{1}{5} + \frac{7}{16}$

7. A phone call costs £0.04. How many calls can I make if I have £ 3.52?

8. Sketch the resultant vector on the diagram below.



9. Yesterday, of the 240 flights leaving London Airport, 15% were bound for North America how many flights didn't fly to North America?

10. Find the value of x: $2^{(-x+3)} = 64$

11. The map ratio of a map is 1:50,000. The distance between A and B on the map is 6 cm what is the true distance between A & B?

12. A factory produces cars in red, blue, white and green the ratio is 7:5:3:1. Out of a production of 48000 cars, how many are white?

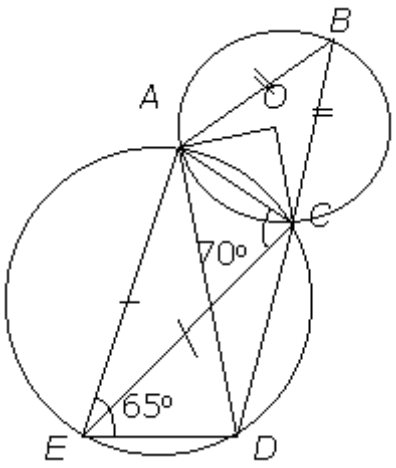
13. In the diagram, the points A, B, C, D and E lie on the circumference of the two circles such that AEDC forms a cyclic quadrilateral and BCD is a straight line. The centre of the smaller circle is marked as O. Given that AB = BC, AE = CE, angle AED = 65° and angle ACE = 70°, find

    (i) angle ACB

    (ii) angle ABC

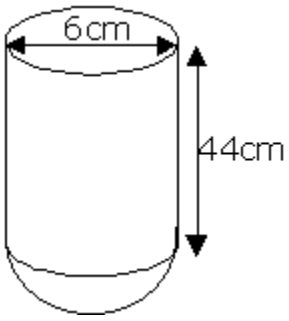
    (iii) angle OAC

    (iv) angle ADC



14. A container is made up of a cylinder with a hemisphere attached as shown. the internal diameter of the hemisphere is 6cm and the height of the cylinder is 44cm.

    Calculate the volume of the container, leaving your answers in terms of π.



15. Cement is poured into the container until it is half full. Find the height of the cement above the lowest point of the container.

16. Find the surface area of the container in contact with the cement, leaving your answers in terms of π.