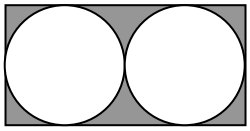
Sample Questions for TOPS - Mathematics

1. Which of the following numbers is closest to $\frac{2.7 \times 32}{14.7}$?

a) 60 b) 6 c) 90 d) 3 e) 0.6

2. Two circles of equal size are inscribed in a rectangle as shown:



If the radius of each circle is 1 cm then the shaded area in square centimeters is:

a) $\pi - 4$ b) $8 - 2\pi$ c) $8 - \pi$ d) $4 - 2\pi$ e) 4

3. A truckload of nails contains *x* cartons. Each carton contains *y* boxes. Each box contains *z* nails. The number of nails in the truckload is:

a) $x + y + z$ b) $xy + xz + yz$ c) $\frac{xy}{z}$ d) $x(y + z)$ e) yzx

4. To make plum wine, sugar is added to juice until the volume increases by 10%. The plum juice is in a cylindrical container with a base of radius 12 cm and a height of 16.5 cm. What height in centimeters of plum juice is needed so that when the sugar is added the container is just filled?

a) 12 b) 13 c) 14 d) 15 e) 16

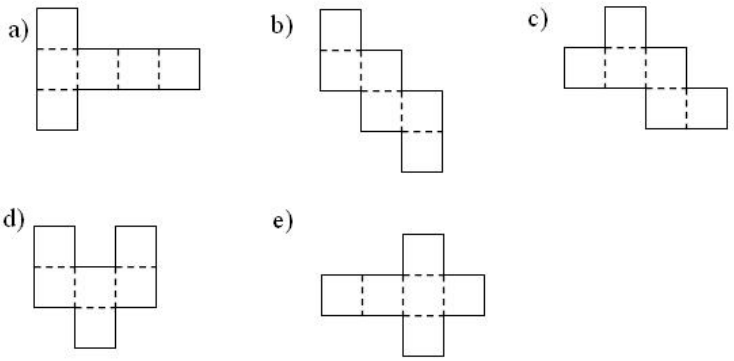
5. The operation * is defined by: $a * b = \frac{1}{a} + \frac{1}{b} + ab$. The value of $\frac{1}{3} * 6$ equals:

a) 2 b) 18 c) $5\frac{1}{6}$ d) $2\frac{1}{2}$ e) $8\frac{1}{3}$

6. A clock is set correctly at 1:00 pm. It loses 3 minutes every hour. What will the clock read when the correct time is 10:00 am the next day?

a) 9:03 b) 10:00 c) 11:03 d) 8:57 e) 11:06

7. Which of the following figures can not be folded along the dotted lines shown to form a cube?



8. During a particular morning, a light signal goes on at precisely 9:00 am. Thereafter it goes off and on at equal intervals, each interval lasting a whole number of minutes. Later that morning it is observed that the light is off at 9:09, on at 9:17 and on at 9:58. The light will be on during the morning at both:

a) 10:30 and 11:21
b) 10:14 and 11:00
c) 10:23 and 11:01
d) 10:25 and 11:33
e) 10:40 and 11:46

Sample Questions for TOPS - Science

1. Few comets are bright enough to be seen without the aid of a telescope. Although an unexpected and bright comet, one not observed before, may appear at any time, predictions can only be made for those comets that are called periodic because they have been observed to appear…

   a) with great brilliance.
   b) at unexpected times.
   c) in the twentieth century.
   d) at regular intervals.

2. Most mammals have two sets of teeth just as humans have. The whalebone whale has two sets of teeth, but both sets of teeth are lost before the baby whale is born. Neither set is ever used. Many biologists believe that in the evolutionary development of the whale there was a primitive ancestor for which the teeth were useful, and that in later stages they became…

   a) completely lost.
   b) less important.
   c) more important.
   d) highly developed.

3. You are familiar with these warning symbols:

   Show how many other symbolic signs you can devise.

4. The next two questions are based on the following experiment:

   > *"I boiled some hay in water for half an hour. I then put equal amounts of this hay infusion in two jars of about the same size. Before the infusion cooled, I covered one of the jars with a cloth. The other jar was left uncovered. After several days, organisms appeared in the uncovered jar. There were none in the covered jar. The uncovered jar was kept for a long time to see if any organisms appeared, but none did."*

   Which of the following would be considered the experiment variable in the investigation?

   a) exposure to air
   b) boiling the water
   c) length of the experiment
   d) use of hay for the experiment

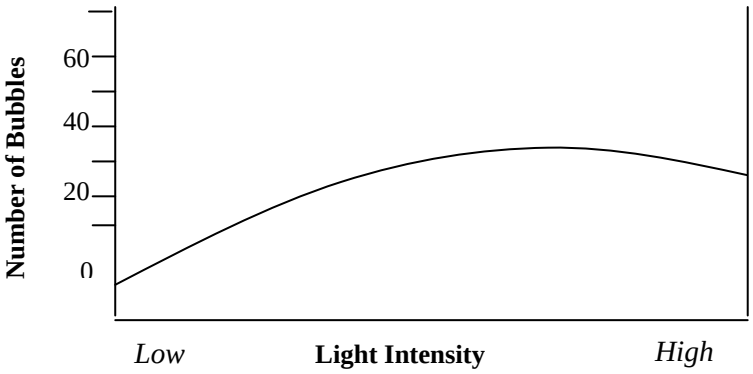
   Without an uncovered jar, which of the following could have been determined by this experiment?

   a) Air is a source of contamination.
   b) Organisms are damaged by boiling.
   c) The hay infusion can support certain kinds of life.
   d) None of the above could have determined.

5. Use three sixes to make 7.

6. Use three fours to make 11.

7. The next two questions refer to the following information and graph.



The number of bubbles released from the plant is…

a) proportional to the light intensity throughout the investigation.
b) decreased halfway through the investigation.
c) related to the light intensity during most of the investigation.
d) independent of light intensity during the investigation.

The release of bubbles indicates the rate of…

a) fermentation.
b) photosynthesis.
c) growth.
d) respiration.