

Sample Question Paper – Entrance examination

1. If the length and width of rectangle  $A$  are 10 percent less and 30 percent less, respectively, than the length and width of rectangle  $B$ , the area of  $A$  is equal to what percent of the area of  $B$ ?
  - (a) 63%
  - (b) 60%
  - (c) 6%
  - (d) 3%
  
2. Which of the following equation satisfies the condition that the sum of the two roots is 5 and their product is 6?
  - (a)  $x^2 + 5x - 6 = 0$
  - (b)  $x^2 - 6x + 5 = 0$
  - (c)  $x^2 - 5x + 6 = 0$
  - (d)  $x^2 + 6x + 5 = 0$
  
3. In the  $xy$ -plane, the points with coordinates  $(0,-5)$  and  $(6,-2)$  lie on line  $m$ . Line  $p$  contains the point with coordinates  $(-5,0)$  and is perpendicular to line  $m$ . What is the  $x$ -coordinate of the point where lines  $m$  and  $p$  intersect?
  - (a) -5
  - (b) -4
  - (c) -3
  - (d) -2
  
4. Given that  $f(x) = (1+x)^2$ , is defined for  $-2 \leq x \leq 2$ . What is the range of  $f$ ?
  - (a)  $0 \leq f(x) \leq 5$
  - (b)  $1 \leq f(x) \leq 5$
  - (c)  $0 \leq f(x) \leq 9$
  - (d)  $1 \leq f(x) \leq 9$
  
5. The numbers 3, 5, and 7 are three consecutive odd numbers that are prime. How many other triplets of consecutive odd numbers greater than 1 consist entirely of primes?
  - (a) None
  - (b) One
  - (c) Two
  - (d) More than 3
  
6. A right circular cylinder has radius 3 and height 3. If  $P$  and  $Q$  are two points on its surface, what is the maximum possible straight-line distance between the two points?
  - (a)  $3\sqrt{3}$
  - (b)  $3\sqrt{6}$
  - (c)  $3\sqrt{4}$
  - (d)  $3\sqrt{5}$
  
7. Six faces of die  $A$  are marked 1,2,3,4,5,6 and the six faces of die  $B$  are marked 1,2,3,3,3,4. When a die is thrown each face is equally likely to finish on top. If both the dice  $A$  and  $B$  are thrown together what is the probability that the sum of the values on top is 9?
  - (a)  $1/6$
  - (b)  $1/9$
  - (c)  $1/4$
  - (d)  $1/5$
  
8. Given:
 

$U = \{ \text{set of all integers between 1 and 101 with integer square roots} \}$   
 $V = \{ \text{set of all even integers greater than 1 and less than 100} \}$

How many elements will be there in  $U \cap V$ ?

  - (a) 5
  - (b) 4

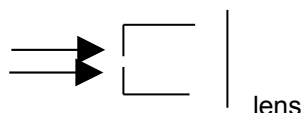
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- (c) 3  
(d) 2
9. Which of the following is the third term of the expansion of  $(x^2 - x)^{20}$ ?
- (a)  $190x^{39}$   
(b)  $-190x^{39}$   
(c)  $1140x^{38}$   
(d)  $-1140x^{38}$
10. Given that:  
 A weighs more than B and  
 C weighs more than D.  
 D weighs less than E.  
 B and E are exactly the same weight.  
 If the information above is true, which of the following must also be true?
- (a) C weighs more than E.  
(b) C weighs more than A.  
(c) A weighs more than D.  
(d) B weighs less than D.
11. In the past, teachers, bank tellers, and secretaries were predominantly men; these occupations slipped in pay and status when they became largely occupied by women. Therefore, if women become the majority in currently male-dominated professions like accounting, law, and medicine the income and prestige of these professions will also drop.  
 The argument above is based on:
- (a) Another argument that contains circular reasoning  
(b) An analogy between the past and the future  
(c) An appeal to popular beliefs and values  
(d) An attempt to refute a generalization by means of an exceptional case
12. The number codes 3152, 3455 and 5213 stand for three of the words MISS, SHAM, MASH and HAMS. The code for SHAM is:
- (a) 3152  
(b) 2135  
(c) 1253  
(d) 5213
13. Which is the chemical group shown here:  $-\text{CH}=\text{O}$
- (a) Ketone  
(b) Hydroxyl  
(c) Aldehyde  
(d) Carboxyl
14. The comparison of two different groups of cells yielded the following results:
- | <i>Trait</i>               | <i>Cell I</i> | <i>Cell II</i> |
|----------------------------|---------------|----------------|
| Cell wall                  | Present       | Present        |
| Ribosomes                  | Present       | Present        |
| Nucleus                    | Absent        | Present        |
| Ability to photosynthesize | Present       | Absent         |
| Cell respiration           | Present       | Present        |
- Which of the following conclusions is supported by the observations?
- (a) Cell I and II are eukaryotic cells

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- (b) Both cells are from plants.
- (c) Cell I is a prokaryote
- (d) Cell II has a simpler organisation than Cell I

15. A beam of light is incident on a rectangular opening in the box. The box is open at the back. After passing through the box the light is incident on the screen as shown in the figure below. Which of the following device placed in the box would produce a tiny spot of light on the screen?



- (a) A convex
  - (b) A concave lens
  - (c) A thick sheet of glass
  - (d) A prism with vertex pointing down
16. At what value would a Fahrenheit and Celsius scale show the same temperature?
- (a) – 40
  - (b) + 40
  - (c) + 32
  - (d) – 32
17. What will be the change in the kinetic energy of an object with mass  $m$  and speed  $v$  directed to the right strikes a wall and rebounds with speed  $v_0$  directed to the left?
- (a) Zero
  - (b)  $mv_0^2$
  - (c)  $\frac{1}{2}mv_0^2$
  - (d)  $-\frac{1}{2}mv_0^2$

Answer questions 18-21 based on the following passage:

The ability to see is dependent on the actions of several structures in and around the eyeball. When you look at an object, light rays are reflected from the object to the cornea, which is where the miracle begins. The light rays are bent, refracted and focused by the cornea, lens, and vitreous. The lens' job is to make sure the rays come to a sharp focus on the retina. The resulting image on the retina is upside-down. Here at the retina, the light rays are converted to electrical impulses which are then transmitted through the optic nerve, to the brain, where the image is translated and perceived in an upright position! Think of the eye as a camera. A camera needs a lens and a film to produce an image. In the same way, the eyeball needs a lens (cornea, crystalline lens, vitreous) to refract, or focus the light and a film (retina) on which to focus the rays. If any one or more of these components is not functioning correctly, the result is a poor picture. The retina represents the film in our camera. It captures the image and sends it to the brain to be developed. The macula is the highly sensitive area of the retina. The macula is responsible for our critical focusing vision. It is the part of the retina most used. We use our macula to read or to stare intently at an object.

18. The cornea is:
- (a) The only part of the eye that is the lens.
  - (b) The film on which the image is recorded.
  - (c) The most sensitive part of the eye.
  - (d) One of the parts of the eye that acts as a lens.

19. Which of the following focuses light rays

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- (a) The retina
- (b) The macula
- (c) The lens
- (d) The optic nerve

20. Which of the following statements is false

- (a) The image is sent as an electrical signal to the brain
- (b) The image is formed upside down on the cornea
- (c) The image is formed upside down on the retina
- (d) The brain upturns the image so that we perceive it correctly

21. Which of the following statements is true

- (a) Even when light rays are bent they can form an image
- (b) You can see in the dark even though there is no light
- (c) If the macula was removed we would still be able to read
- (d) When fairly strong light comes from behind an object we cannot see it at all

22. Which of the following has the closest meaning to “Birds of a feather flock together”?

- (a) One swallow does not make a summer
- (b) A bird in hand is worth two in the bush
- (c) Fine feathers make fine birds
- (d) A man is known by the company he keeps

Select the word or phrase which has the closest meaning to the word:

23. Scenario

- (a) Landscape
- (b) Plan of action
- (c) Screened in area
- (d) Symphony

24. Plummet

- (a) To choose
- (b) Slow down
- (c) Discard
- (d) Fall rapidly

25. Aerospace

- (a) Atmosphere
- (b) Aeroplane seat
- (c) Aircraft hangar
- (d) Dock