1. A card is drawn at random from a well-shuffled pack of 52 playing cards. Find the probability of getting neither a red card nor a queen.

2. For what value of k will $(k+9), (2k-1)$ and $(2k+7)$ be consecutive terms of an A.P.?

3. In Fig. 1, a quadrilateral $ABCD$ is drawn to circumscribe a circle with center O, such that the sides AB, BC, CD, and DA touch the circle at points P, Q, R and S respectively. Prove that $AB + CD = BC + DA$.

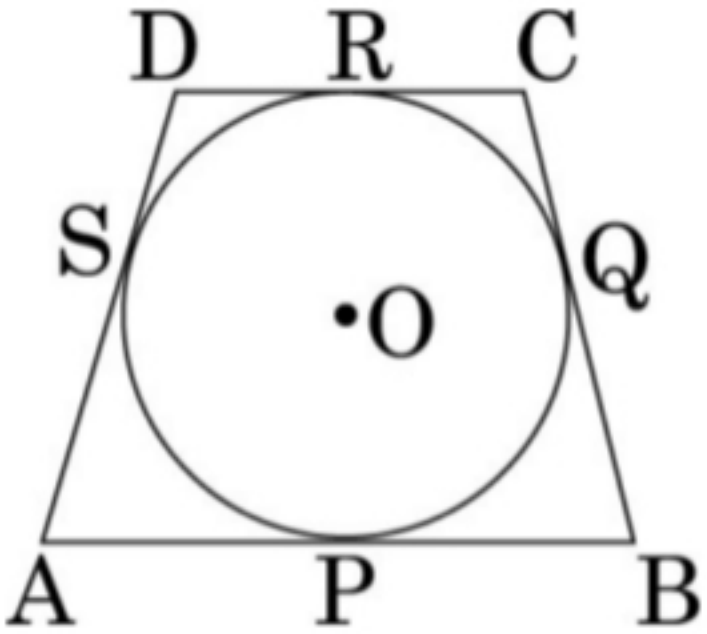

Figure 1: Quadrilateral ABCD

4. Solve for x:

$$\sqrt{6x+7} - (2x-7) = 0 \tag{1}$$

5. In Fig. 2, a tent is in the shape of a cylinder surmounted by a conical top of the same diameter. If the height and diameter of the cylindrical part are $2.1m$ and $3m$ respectively, and the slant height of the conical part is $2.8m$, find the cost of the canvas needed to make the tent if the canvas is available at the rate of $|500/m^2$. (Use $\pi = \frac{22}{7}$)

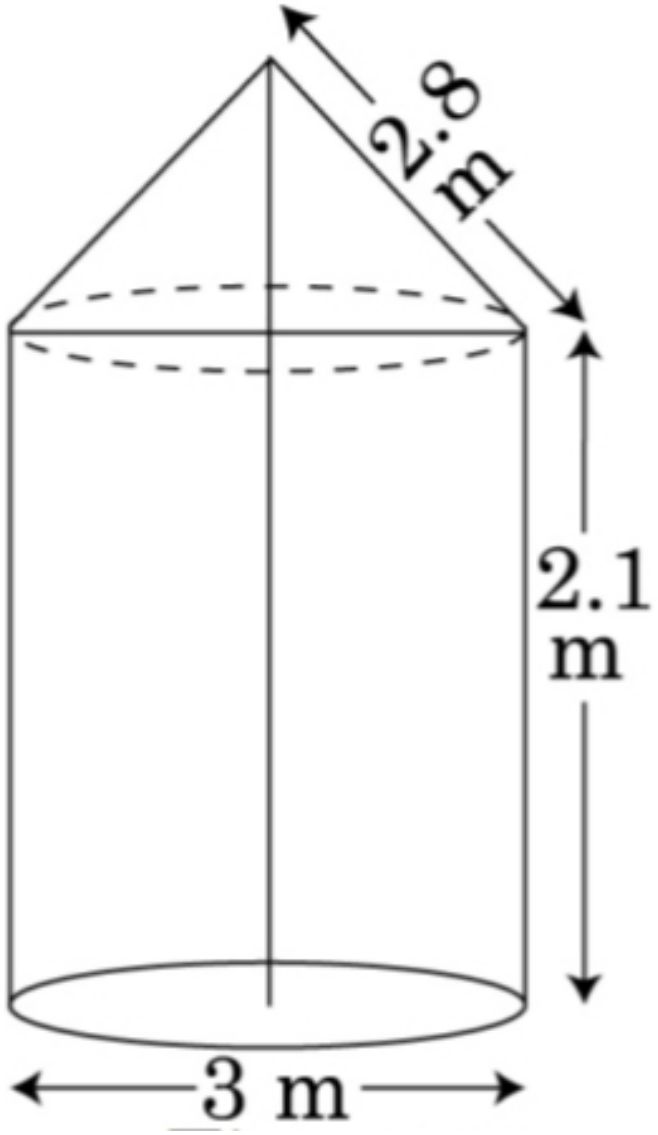

Figure 2: Cone on top of a cylinder

6. A sphere of diameter $12cm$ is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by $3\frac{5}{9}cm$. Find the diameter

of the cylindrical vessel.

7. There are 100 cards in a bag on which numbers from 1 to 100 are written. A card is taken out from the bag at random. Find the probability that the number on the selected card

   (a) is divisible by 9 and is a perfect square.

   (b) is a prime number greater than 80.

8. Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the numbers.

9. The sums of the first n terms of three arithmetic progressions are S_0, S_2 and S_3 respectively. The first term of each A.P. is 1 and their common differences are $1, 2$ and 3 respectively. Prove that $S_1 + S_3 = 2S_2$.

10. Due to heavy floods in a state, thousands were rendered homeless. Fifty schools collectively offered to provide place and canvas for 1500 tents to be fixed by the government and decided to share the whole expenditure equally. The lower part of each tent is cylindrical with a base radius of $2.8m$ and height $3.5m$, with a conical upper part of the same base radius but of height $2.1m$. If the canvas used to make the tents costs $|120/m^2$, find the amount shared by each school to set up the tents. What value is generated by the above problem? (Use $\pi = \frac{22}{7}$)

11. In Fig. 3, the vertices of $\triangle ABC$ are $A(4, 6), B(1, 5)$ and $C(7, 2)$. A line segment DE is drawn to intersect the sides AB and AC at D and E respectively such that $\frac{AD}{AB} = \frac{AE}{AC} = \frac{1}{3}$. Calculate the area of $\triangle ADE$ and compare it with the area of $\triangle ABC$.

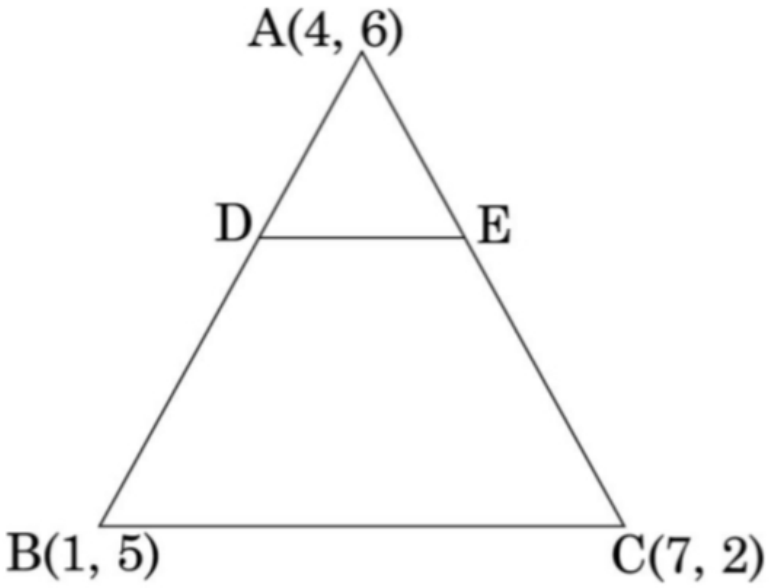

Figure 3: Triangle ABC

12. A motor boat whose speed is $24km/hr$ in still water takes 1 hour more to go $32km$ upstream than to return downstream to the same spot. Find the speed of the stream.

13. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank separately, find the time in which each pipe would fill the tank separately.

14. From a point on the ground, the angle of elevation of the top of a tower is observed to be 60°. From a point $40m$ vertically above the first point of observation, the angle of elevation of the top of the tower is 30°. Find the height of the tower and its horizontal distance from the point of observa-

tion.

15. Draw a triangle with sides $5cm, 6cm$ and $7cm$. Then draw another triangle whose sides are $\frac{4}{5}$ of the corresponding sides of the first triangle.