CLOCKS, CALENDARS, DIRECTION SENSE AND CUBES

Concepts

Clocks:

- Minute hand traces 6° in 1 minute.
- Hour hand traces 30° in 1 hour and (1/2)° in 1 minute.
- Minute hand gains 330° in 60 minutes over hour hand.
- If a clock loses minutes, it will be slow and if the clock gains it will be fast.
- Minute hand and hour hand meet every $65\frac{5}{11}$ min.

Calendar:

- An ordinary year has 1 one odd day, whereas a leap year has 2 odd days.
- Century years should be divisible by 400 as a check for leap year.
- For 100 years, there are 5 odd days; for 200 years, there are
- 3 odd days; for 300 years, there is only one odd day; for 400 years and multiples of 400 years, there are 0 odd days.

Directions: Position of the person with respect to some point should not be confused with the direction he is facing.

Cubes:

- Number of pieces will be one more than the number of cuts in a particular direction.
- Opposite sides and adjacent sides painted should not be confused.
- If we make a cut on each side (along height, length and breadth) we get 2 × 2 × 2 = 8 pieces.

Drill

1. Find the angle between the hands of the clock.

2. What is the reflex angle between the hands of the clock at 3 o' clock?
3. If a clock gains 5 minutes every hour and it is set right at 5 a.m., then what is the exact time when it shows 10 a.m.?
4. Find the number of odd days in a decade.
5. What is the number of odd days in the year 2010?
6. How many leap years and normal years are there in the 3rd century?(Hint: Year 300 is not a leap year)
7. What day of the week is 29th July 1971?
8. Deepak starts early in the morning from his house and jogs towards north for 2 km. Then he turns left and jogs for 1 km.
   a. Now, what is his position with respect to his house?
   b. Which direction is he facing?

   He then takes a right turn and jogs 3 km and again takes a right turn and jogs 1 km.
   c. Now his position with respect to his house is_____.
   d. The direction that he is facing is_____.
   e. The distance of his current position from his house is____.
9. A man walks 10 km towards north. From there he walks 6 km towards south and then 3 km east. How far and in which direction is he with reference to his starting point? (Hint: Use Pythagoras theorem to find the distance)
10. If you make 4 cuts on one side of a cake, how many pieces do you get?
11. How many pieces will you get if you make 4 cuts along the length and 4 cuts along the breadth of a solid cube?
12. If you make 4 cuts along all the three dimensions of a cube, then how many small cubes will you get?
13. How many cuts should be made to get 64 small cubes out of a cube?
14. A cube of side 4 cm is cut into smaller cubes of side 1 cm.
    a. How many smaller cubes are painted on two faces?
    b. How many cubes are painted on three faces?
    c. What is the maximum number of cubes that can be taken out of the bigger cube and make it a hollow one?

Concept review questions

1. At what time between 5 a.m. and 6 a.m. will the hands of the clock meet each other?
   a. 5:30 b. 5:25 5/11 c. 5:42 5/11 d. 5:27 3/11
2. If the hands of a clock coincide every 64 minutes, then how much time does the watch gain per day?
   a. 360/11 min b. 365/11 min c. 90 min d. None
3. A clock, which gains 5 minutes every 12 hours, is set right at 5 a.m. What will be the real time, when the clock shows 5 p.m. on the following 5th day?
   a. 4:55 pm b. 4:05 pm c. 5:05 pm d. 5:55 pm
4. At what time between 5:30 and 6:00 will the hands of the clock be at right angles?
   a. 43 min past 5 b. 40 7/11 min past 5 c. 43 7/11 min past 5 d. 45 min past 5
5. On planet FACE, there are 10 days in a week. There are 36 hours in a day and each hour has 90 minutes while each minute has 60 seconds. As on Earth, the hour hand covers the dial twice every day. Find the approximate angle between the hands of the clock on FACE when the time is 14:40 a.m.?
   a. 83 b. 74 c. 129 d. 65
6. The last day of a century cannot be a
   a. Monday b. Tuesday c. Wednesday d. Thursday
7. Which year will have the same calendar as that of the year 2007?
   a. 2014 b. 2016 c. 2018 d. 2019
8. The first Republic Day of India was celebrated on 26th January, 1950. It was on a
   a. Tuesday b. Wednesday c. Thursday d. Friday

Directions for questions 9 to 16: A solid cube of side 8 cm has been painted red, blue and black on pairs of opposite faces. It is then cut into cubical blocks of side 2 cm each.

9. How many cubes have no face painted?
   a. 1 b. 4 c. 8 d. 27

10. How many cubes have only one face painted?
    a. 8 b. 16 c. 24 d. 28

11. How many cubes have only two faces painted?
    a. 8 b. 16 c. 20 d. 24

12. How many cubes have three faces painted?
    a. 0 b. 4 c. 6 d. 8

13. How many cubes have three faces painted with three different colours?
    a. 0 b. 4 c. 8 d. 12

14. How many cubes have two faces painted red and black and all the other faces unpainted?
    a. 4 b. 8 c. 16 d. 32

15. How many cubes have one face painted red and all the other faces unpainted?
    a. 4 b. 8 c. 12 d. 16

16. How many cubes have two of their faces pai ted black?
    a. 2 b. 4 c. 8 d. None

Directions for questions 17 to 19: If you start running from a point towards north and after covering 4 km, you turn to your left and run 5 km and then again turn left and run another 6 km and before finishing you take a left turn and run for 1 km.

17. How far are you from the starting point?
    a. $1\sqrt{5}$ km b. $2\sqrt{5}$ km c. $3\sqrt{5}$ km d. $4\sqrt{5}$ km

18. In which direction will you be at the end (with reference to the starting point)?
    a. East b. West c. North d. South

19. After taking the second turn, in which direction will you be running?
    a. East b. West c. North d. South

20. A child is looking for his father. He went 90 m east before turning right. He then went 20 m before turning to the right again to look at his uncle's place 30 m from that point. His father was not there. From there he went 100 m north, before meeting his father in a street. How far was the father from the starting point?
    a. 80 b. 100 c. 140 d. 260