

2006 Primary Set 1 solutions

P1.1. When the seven dwarfs waved goodbye to Snow White they walked home in single file. Happy was as many places in front of Sleepy as Dopey was behind Doc. Sleepy and Grumpy were in even numbered places and Dopey was in an odd numbered place. Sneezy was behind Dopey and Doc was behind Sleepy, but there is no information about Bashful's place. In what order did the dwarfs walk home? **Explain your reasoning.**

Solution

We are told that Happy is in front of Sleepy who is in front of Doc who is in front of Dopey who is in front of Sneezy.

Now Sleepy is in an even numbered place (2, 4 or 6); he can't be in position 6 as there are 3 dwarves behind him.

If Sleepy is in position 4, Doc, Dopey and Sneezy must be in positions 5, 6 and 7, respectively. But Dopey is in an odd position, so Sleepy can't be in position 4 and must be in position 2.

Happy is therefore in position 1.

As Sleepy is in position 2, Dopey can't be in position 3 (because Doc is between Sleepy and Dopey) or in position 7 (as Sneezy is behind Dopey), so must be in position 5.

As Happy is one place in front of Sleepy, Doc must be one place in front of Dopey, so Doc is in position 4.

One even numbered place, 6, is left, so Grumpy must be in position 6.

As Dopey is in position 5, and Grumpy is in position 6, Sneezy, who is behind Dopey, must be in position 7.

Finally Bashful must take the last remaining place, so is in position 3.

The dwarves walk home in the order:

Happy, Sleepy, Bashful, Doc, Dopey, Grumpy, Sneezy.

P1.2. During a very hard winter, Liam had only enough hay and corn to feed his six horses for another 30 days and it would be another 75 days before spring would arrive. On the seventh day, before feeding time, Liam sold four of his horses. Will he be able to feed his remaining two horses for the rest of the winter? **Explain your reasoning.**

Solution

When Liam sold the horses, 69 days of winter remained and he had enough food to feed 6 horses for another 24 days. That is he could feed 2 horses for 72 days. The food will last out.

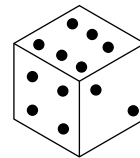
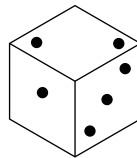
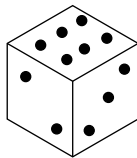
Alternative

At the start, Liam had $6 \times 30 = 180$ portions of horse food.

He used $6 \times 6 = 36$ portions whilst he still had 6 horses so had 144 portions left.

With 69 days to go and 2 horses to feed, he needs 138 portions so the food will last out.

P1.3. A dice maker makes mistakes when painting the spots on some dice. Below are three views of one of the dice he makes. How many spots are there on the bottom face in view 1 (i.e. the face opposite the six)? **Explain your reasoning.**



Solution

Observe that we can see faces with 1,2,3,4 and 6 spots.

In all three views we see a face with 2 spots. Place that face so that the spots run from top left to bottom right. Now look at the faces adjoining that face along its sides (left and right). We see faces with 3 spots, 1 spot and 4 spots. If there was only one face on the dice with 2 spots, there would be exactly 2 faces adjacent to it along its sides to left and right. So there must be two faces with 2 spots. The other faces will have 1, 3, 4 and 6 spots. We can now draw a plan of the cube and we see that the face opposite the six has 2 spots.

