

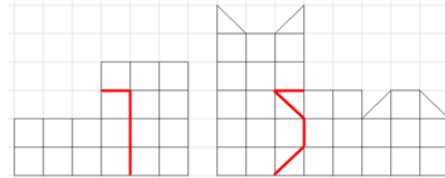
Puzzles and Quizzes - Answers

Day 1

Easier Problem - Arsenal 2 Man City 3, Arsenal 0 Liverpool 2, Man City 0 Liverpool 0. **Harder Problem** - Czech Rep 0 England 0, Czech Rep 0 Croatia 1, Czech Rep 0 Norway 0, England 1 Croatia 0, England 1 Norway 0, Croatia 3 Norway 2. **Quiz** - cassowary, armadillo, aye aye, anteater, nautilus, narwhal, baboon, sunfish, manatee, trumpet fish.)

Day 2

Quiz - penne, farfalle, lasagne, spaghetti, fusilli, radiatori, conchiglie, macaroni, linguine, ruote. **Problems** -



Day 3

Quiz - Mr Grumpy, Mr Strong, Mr Sneeze, Little Miss Sunshine, Mr Noisy, Mr Jelly, Little Miss Christmas, Mr Messy, Mr Rush, Little Miss Chatterbox. **Problems** -

2	3	2	0	5	0	4	1	4	3	2	3
3	■	3	5	■	5	1	■	1	2	■	2
2	3	2	0	5	0	4	1	4	3	2	3

Day 4

Quiz - Pyramids of Giza, Wembley Stadium, London Eye, Angel of the North, Leicester Square, Thorpe Park, Eiffel Tower, Sydney Harbour Bridge, Heathrow Airport, Stonehenge.

Easier Problem - Weigh two groups of three. If one is heavier, take that group of three and weigh one against one – if one ball is heavier it's that one, if neither is heavier it must be the other ball. If both groups weigh the same, take the remaining group of two and weigh one against one.

Harder Problem (yes, this is very difficult!) -Test 1: Weigh ball 1, 2, 3, 4 versus 5, 6, 7, 8.

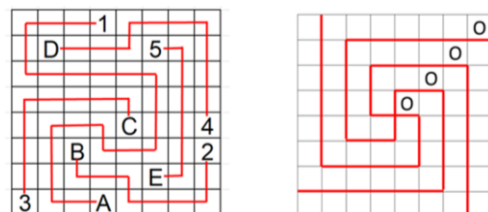
If Test 1 does balance: It is one of the balls from 9, 10, 11, or 12. Test 2: Weigh 1, 2, 3 versus 9, 10, 11. If Test 2 does balance, the odd ball is 12. For the third test, compare it to any of the other balls to check whether it is heavier or lighter. If Test 2 doesn't balance, the odd ball is 9, 10, or 11. It is heavier or lighter depending on how the scale tipped in 2.1. For the third test, compare 9 and 10. If they balance, it is 11. If they don't balance, it is whichever one is lighter or heavier (depending on the results from #2).

If Test 1 doesn't balance: We know that 9, 10, 11, and 12 are normal. Test 2: Compare 2, 3, 5 and 7 versus 4, 6, 9 and 10. If Test 2 balances, it is 1 or 8. Compare 1 versus 2. If they are equal, it is ball 8, and it is lighter or heavier depending on how the scale tips in test #1. If they are unequal, it is #1, and it is lighter or heavier depending on how the scale tips in this test (and in test 1). If Test 2 doesn't balance: This is easier to explain if we just say that 1-4 was heavier than 5-8. It works either way. If 2, 3, 5, 7 was heavier than 4, 6, 9, and 10, then it is either that 2 or 3 is heavy, or 6 is light. Weigh 2 versus 3. If they are equal, 6 is light. If 2 is heavier, then 2 is heavy. If 3 is heavier, then 3 is heavy. If 2, 3, 5, 7 is lighter than 4, 6, 9, and 10, then it is either that 5 or 7 is light, or 4 is heavy. Compare 5 versus 7, and interpret as before. If they are equal, 4 is heavy. If 5 or 7 is light, 5 or 7 is light.

Day 5

Quiz - 1) red heart 2) total solar eclipse 3) Banksy 4) knee 5) Taylor Swift 6) 8 points 7) scuba 8) tomatoes 9) Ford Fiesta 10) Princess Charlotte.

Problems -



Day 6

Easier Problem - add a line to the top of the second "1" so that it reads 10 TO 10 = 9.50. **Harder Problem** - $75 \times 2 = 150$, $150 + 7 - 1 = 156$, $156 \times 6 = 936$. **Quiz** - York, Portsmouth, Liverpool,

Birmingham, London - the venues for our last five Patient Education Days!

Day 7

Problem - What happens if we started off with our first egg going up ten at a time? We can start from step 10; if it survives we try step 20, then step 30 ... we carry on until the first egg breaks. Once we've broken our first egg we know that the solution must lay somewhere in the nine steps just below, so we go back nine steps and go up these steps one at a time until we find a solution. If our first egg broke on step 100. This has taken us ten drops so far. Now we know the solution must lay somewhere between step 91 and step 99 and we have to go through these in ones, starting at step 91. The worst case would be if the solution was on step 99, and this would take us nine more drops to determine. The worst case therefore, if we go by tens, is 19 drops. Can we do better?

What if we dropped our first egg from step 11 instead? If the egg breaks on this step, it will still only take ten more drops to find the solution (and if it doesn't break, great, we've eliminated more steps than before! win-win?) Well, how about if we dropped our first egg from step 12 then? A similar argument to above; if it breaks, we only have to try eleven steps with the second egg. If it doesn't break, we can step up another dozen steps, and so on. But if first we try steps 12, 24, 36, 48, 60, 72, 84, 96 then it finally breaks, we've wasted eight drops already, and we still have to check (up to) eleven more steps with our second egg, so we're back at a worst case of 19 drops.

Our first drop should be from step 14, if the egg survives we step up 13 steps to step 27, then up 12 steps to 39, 11 steps to 50, 10 steps to 60, 9 steps to 69, 8 steps to 77, 7 steps to 84, 6 steps to 90, 5 steps to 95, 4 steps to 99, and then 1 step to 100. This gives a worst case of 14 drops.

Quiz – (answers supplied by Mark Wanvig, a former instructor in survival training for the 101st Division of the US Army. This survival simulation game is used in military training classrooms.)

1. Box Of Matches - The biggest danger is the cold. The greatest need is warmth and the second greatest need is for signalling devices. This makes building a fire the first order of business.
2. Ball of cotton wool - This is the best substance for supporting a flame and starting a fire.
3. Extra shirt - Besides adding warmth to the body, clothes can also be used for shelter, signaling, bedding, bandages, string (when unravelled), and fuel for the fire.
4. Empty Biscuit Tin - A mirror-like signalling device can be made from the lid to reflect the sun. While this could be limited by the trees, someone could climb a tree and use the lid to signal search planes (before taking off the pilot has to file a flight plan which contains vital information). Even with no other means of signalling, there is an 80% chance of being rescued within the first day. The empty tin is useful in melting snow for water. It is much safer to drink warm water than to eat snow, since it will help retain body heat. Water is vital because dehydration will affect decision-making.
5. Heavy-Duty Canvas 5m x 5m - The cold makes shelter necessary, and canvas would protect against wind and snow. Spread on a frame made of trees, it could be used as a tent or a windbreak. It might also be used as a ground cover to keep the survivors dry. It's shape, when contrasted with the surrounding terrain, makes it a signalling device.
6. Axe - Survivors need a constant supply of wood in order to maintain the fire, as well as for clearing a campsite, cutting branches for ground insulation, and constructing a frame for the canvas tent.
7. Chocolate bars (one each) - Chocolate will provide some food energy. Since it contains mostly carbohydrates, it supplies the energy without making digestive demands on the body.
8. Loaded pistol - The pistol provides a sound-signalling device. (The international distress signal is 3 shots fired in rapid succession). There have been numerous cases of survivors going undetected because they were too weak to make a loud enough noise to attract attention. The powder from the shells could assist in fire building. Although it could be used in hunting, it would take an expert shot.
9. Bottle of whisky - The only use for whisky is as an aid in fire building and as a fuel for a torch. The empty bottle could be used for storing water. The danger is that someone might drink it. Alcohol dilates the blood vessels in the skin, resulting in a rapid loss of body heat and hypothermia.
10. Plastic Map - This is the least desirable of the items because it will encourage individuals to try to walk to the nearest town – very difficult due to the distance, likely shock of the survivors, snow, clothes, and rivers. It would mean almost certain death from freezing and exhaustion. It's only useful feature is as a ground cover to keep someone dry.