Halloween maths activities for IB Maths SL and HL: IGCSE / GCSE

IB Math Revision · IGCSE and GCSE (Higher and Extended) · 31 October · Student sheet

Name _____ Class _____ Date _____

The starter is non-calculator. A calculator is needed for the main activity.

Starter (5 minutes)

1. A pumpkin costs £2.40. In a Halloween sale it is reduced by 25%. What is the sale price?

2. A bag holds 5 toffees and 3 chocolate eyeballs. One sweet is taken at random. What is the probability it is a chocolate eyeball?

3. Find the midpoint of the points $(-2, 7)$ and $(6, 1)$.

4. Write $2^3 \times 2^4$ as a single power of 2, then work out its value.

Main activity (35 minutes)

Task A: Zombie outbreak

At midnight on 31 October there are 50 zombies in a town. The number of zombies increases by 40% every hour.

a. How many zombies are there after 1 hour?

b. Explain why the number of zombies after t hours is 50×1.4^t. Use it to find the number after 6 hours, to the nearest whole number.

c. The town has 12 000 people. After how many whole hours does the number of zombies first go above 12 000?

Task B: Pumpkin geometry

A pumpkin is modelled as a sphere with diameter 24 cm. Volume of a sphere = $\frac{4}{3}\pi r^3$; surface area = $4\pi r^2$.

a. Find the volume of the pumpkin. Give your answer to 3 significant figures.

b. Find the surface area of the pumpkin, to 3 significant figures.

c. The pumpkin is hollowed out to make a lantern. The hollow is a sphere of radius 10 cm. What percentage of the pumpkin's volume is removed? Give your answer to 1 decimal place.

d. A smaller pumpkin is mathematically similar, with diameter 18 cm. Find its volume to 3 significant figures.

Task C: Trick or treat

At each house, the probability of getting a treat is 0.7. Otherwise you get a trick. Houses are independent.

a. Draw a tree diagram for two houses. Find the probability of two treats.

b. Find the probability of exactly one treat.

c. A bowl holds 6 toffees and 4 lollipops. Two sweets are taken without replacement. Find the probability that both are the same type.

Task D: Haunted house maze

On a plan of a haunted house, a ghost glides in a straight line from the door D(1, 2) to the treasure chest C(9, 8).

a. Find the length of DC.

b. Find the equation of the line DC in the form $y = mx + c$.

c. A secret wall runs through the midpoint of DC, at right angles to DC. Find its equation in the form $ax + by = c$.

d. Is the trapdoor T(8, 1) on the secret wall? Show how you know.

Extension

1. Scientists find a cure. Each hour the zombies first increase by 40%, then 30 of them are cured. Show that if there are exactly 75 zombies, the number never changes. What is the smallest whole number of zombies for which the outbreak still grows?

2. Find the shortest distance from the trapdoor T(8, 1) to the ghost's path DC.