

December 2020

Christmas and New Year
#SolveItWithSTEM@Home Activity Pack for
Secondary Schools
featuring Alice and Eddie – our STEM Gurus





Hi everyone, Eddie and Alice here!
You may recognise us from a few months ago back in the Summer...seems quite some time ago now.

We have decided to put together a **Christmas and New Year edition of #SolveItWithSTEM@Home** so you can enjoy a variety of activities at home over the holidays.

We hope you enjoy the festive pack and keeps you busy during the Christmas and New Year break. We have included a couple of fun activities surrounding baking and fizzing trees!!

Have a fantastic Christmas and a Happy New Year. Stay connected with friends and family and most of all, stay safe.

Happy Holidays, Alice and Eddie

12 Days of Safety

At the ExxonMobil Fawley Manufacturing Complex we take safety seriously – especially around the Christmas and New Year holiday. Below we have adapted our 12 Days of Safety to support you and your family this Christmas. It may be slightly different this year however you can still enjoy festivities around the house! Why not check it out...

<p>1 Maintain healthy habits</p> <p>Get plenty of sleep and physical activity where able to do so</p> 	<p>2 Stay connected</p> <p>Try to connect with a friend or family member via a video call</p>	<p>3 Mindful of others</p> <p>Other families or friends may be in different situations so be mindful and be kind</p>	<p>4 Stick to a routine</p> <p>It can take some time getting back into the daily school routine, so why not keep a basic routine at home to help you after the holiday</p>	<p>5 Dining</p> <p>When preparing a meal, wash hands and utensils thoroughly</p> 	<p>6 Candles and festive lights</p> <p>Remember to turn off your Christmas lights and blow out candles</p> 
<p>7 Relax and recharge</p> <p>A lot has happened this year, carve out some time each day to help clear your mind and recharge for school</p>	<p>8 Trees and decorations</p> <p>Keep trees away from fireplaces, radiators & other heat sources</p> 	<p>9 Pets</p> <p>Keep poisonous plants and Christmas decorations away from pets and your young siblings</p> 	<p>10 Travelling</p> <p>If we are able to travel at Christmas, allow extra time as it could be busy</p> 	<p>11 Avoid the 'big rush'</p> <p>Help your parents/family members get organised and avoid peak times for shopping or ordering presents!</p>	<p>12 Climbing ladders or stairs</p> <p>Be careful when carrying presents on the stairs! Hold the handrail where possible</p>

Activity #1: Gingerbread stained glass biscuits

(Make sure you have an adult help you with this activity)

Ingredients/Items Required:

- 175g dark soft brown sugar
- 85g golden syrup
- 100g unsalted butter
- 2-3 tsp ground ginger
- 350g plain flour, plus extra to dust
- 1 tsp bicarbonate of soda
- 1 large egg, lightly beaten
- Clear fruit-flavoured boiled sweet (don't use anything with a soft centre)
- White icing, to decorate
- Star or snowflake cutters

Instructions:

- Heat the sugar, golden syrup and butter in a pan until melted. Mix the ginger and flour in a large bowl and make a well in the centre. Add the bicarbonate of soda to the melted mixture and stir – it will fizz a little – then pour into the flour mixture with the egg. Stir to combine. The mix will be soft but will firm up as it cools.
- Scoop the mixture into a box or fridge bag and chill for at least one hour until firm enough to roll out. *The dough can be kept in the fridge for up to a week or frozen for three months.*
- Heat oven to 190°C/170°C fan/Gas mark 5. Turn the dough out onto a lightly floured surface and cut in half. Briefly knead the first piece, then roll it on a lightly floured surface to 2mm thick. Cut into shapes with snowflake or star cutters about 12cm across, then transfer to lined baking sheets, leaving a little room for them to spread. Cut a window out of each biscuit using another cutter about 6cm across, then add a sweet to the centre.
- If the sweets are large, chop them up first – you'll have to judge by the size of the hole. (Don't be tempted to add too much or it will spill over the edge.) If you plan to hang the biscuits, make a small hole in the top of each one using the end of a piping nozzle (the hole will close up a little so make sure it's big enough). Repeat with remaining dough.
- Bake in batches for 5-6 mins or until they darken slightly and the sweets have melted. If the holes have closed up, remake them while the biscuits are warm. Leave to cool and harden up completely before moving them. Don't forget to bake the parts you've cut out, too! You can decorate the biscuits further by using white piped icing, if you like.



Activity #2: Fizzing Trees Experiment

(Make sure you have an adult help you with this activity)

Items Required:

- Paper plates to make into a cone shape
- Baking soda
- Vinegar
- Water
- Sequins
- Food colouring (green)
- Bowl, spoon, tray to put in the freezer
- Squirt bottle or eyedropper

Instructions:

- Add two cups of baking soda to a bowl.
- Add a couple of food colouring drops to ½ cup of water.
- Add the water and food colouring mix to the baking soda – make sure you get a crumbly but packable dough. It shouldn't be runny!
- Add sequins to the mixture.
- With one of the paper plates, create a cone shape. Using scissors, cut the plate in half and then wrap it around itself. Secure with tape.
- Carefully pack the mixture into the cone shape, making sure it is packed tightly all the way to the tip.
- Place the packed cones on a tray and leave in the freezer overnight.
- Peel off the paper and place the trees in a container. You can add a light covering of baking soda to the bottom of the container for more fizzing action!
- Using a jug and squirt bottle, fill the squirt bottle up with vinegar. Squirt the vinegar over the top of the trees and watch the fizzing commence.

The science behind the baking soda and vinegar reaction, [link here](#)



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This activity was inspired by both:

<https://littlebinsforlittlehands.com/melting-christmas-tree-baking-soda-science-sensory-play/>
<https://science4superheroes.wordpress.com/category/seasonal/christmas/>

Winter wildlife wordsearch

S	T	W	D	C	J	Q	A	R	S	X	Z	T	I
H	A	R	C	T	I	C	F	O	X	O	L	E	Q
T	A	F	G	C	D	N	U	I	F	P	E	R	R
W	U	R	L	O	F	P	E	N	G	E	R	L	I
C	E	A	E	T	R	B	M	G	L	N	R	P	A
I	L	R	O	O	V	E	R	T	E	G	I	E	D
F	E	D	A	X	H	B	I	K	L	U	U	A	R
C	M	X	Z	E	M	O	N	N	T	I	Q	E	R
B	R	I	K	O	B	S	C	P	D	N	S	T	W
L	A	E	F	S	I	R	A	Z	W	E	D	E	N
B	T	E	D	W	P	U	A	R	B	L	E	D	M
P	O	F	G	F	A	E	T	L	I	C	R	R	X
S	T	N	I	B	O	R	A	S	O	E	C	I	I
L	K	Q	D	E	T	X	E	H	J	P	O	O	L

There are many animals associated with the wintery weather both in the UK and around the world!

Using the information below, work out what animals are in the wordsearch. You may find some festive animals included too.....

1. Similar to a rabbit but quicker than a tortoise.

.....

2. Most of these flightless birds live in and around icy Antarctica. There are 18 different species ranging in shape and size.

.....

3. They can be found across the UK in woodlands, gardens and parks. Instantly recognisable with a red breast.

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4. One of the most recognisable wild animals in Britain, this species primarily scavenges for food and has been known to eat household refuse.

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5. With slightly webbed front paws, these animals are very strong swimmers. They are the largest land carnivore.

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6. This furry friend lives in limited areas of the UK with another species sharing the same name but is a different colour – grey.

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7. This animal can survive harsh temperatures as low as -58°F. In the summer, they shed their winter coats for brown and cream fur.

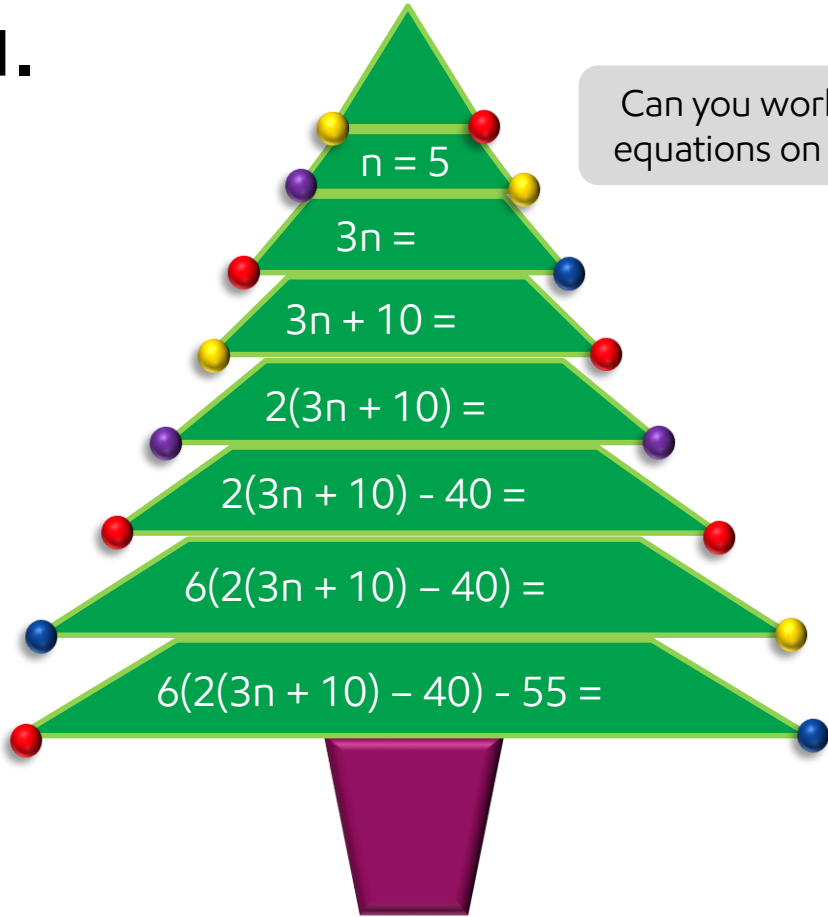
.....

8. Another name for this animal is Caribou and over one year they will have migrated over 1600 miles.

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Merry Maths-mas!

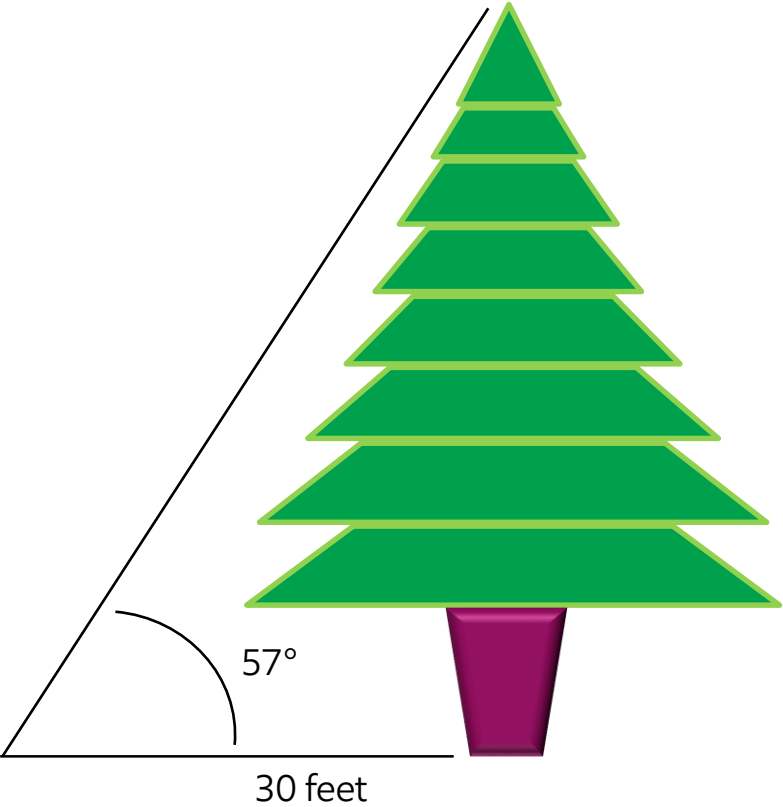
1.



Can you work out the equations on the tree?

2.

Can you work out the height of the tree?
Hint: you will need a scientific calculator



Answers Page

Winter wildlife wordsearch (page 6)

H	A	R	C	T	I	C	F	O	X		L									
	A										P	E								
		R									E	R								
			E		R						N	R								
		R				E					G	I								
			A				I				U	U								
				E				N			I	Q								
	R				B						D	N	S							
		E				R						E	D							
			D				A					E								
				F				L			R	R								
		N	I	B	O	R			O											
						X					P									

Hare

Penguin

Robin

Red Fox

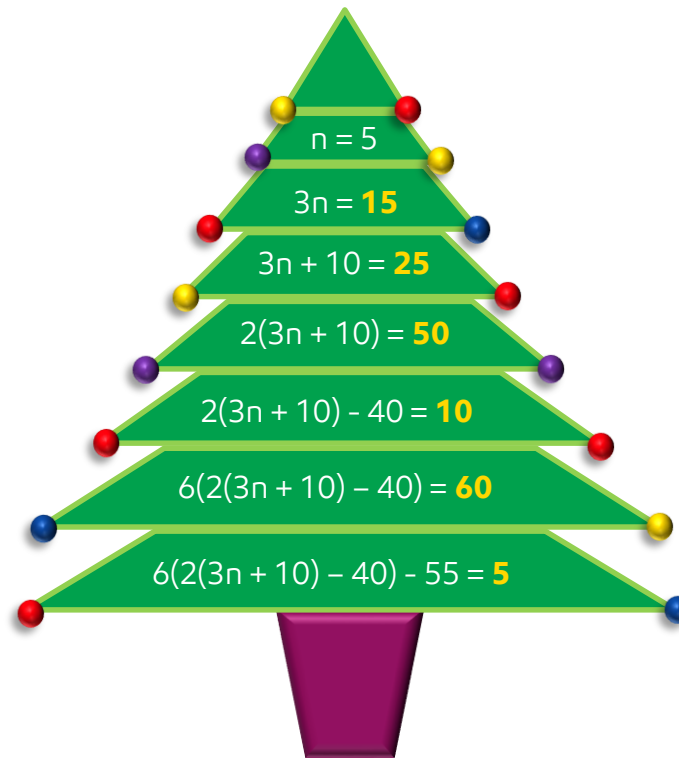
Polar bear

Red squirrel

Arctic Fox

Reindeer

Maths (page 7)



We know the angle of elevation is 57° and the adjacent side is 30ft long. The opposite side is the unknown height.

The trigonometric function relating the side opposite to an angle and the side adjacent to the angle is the tangent. So we will state our information in terms of the tangent of 57° , letting h be the unknown height.

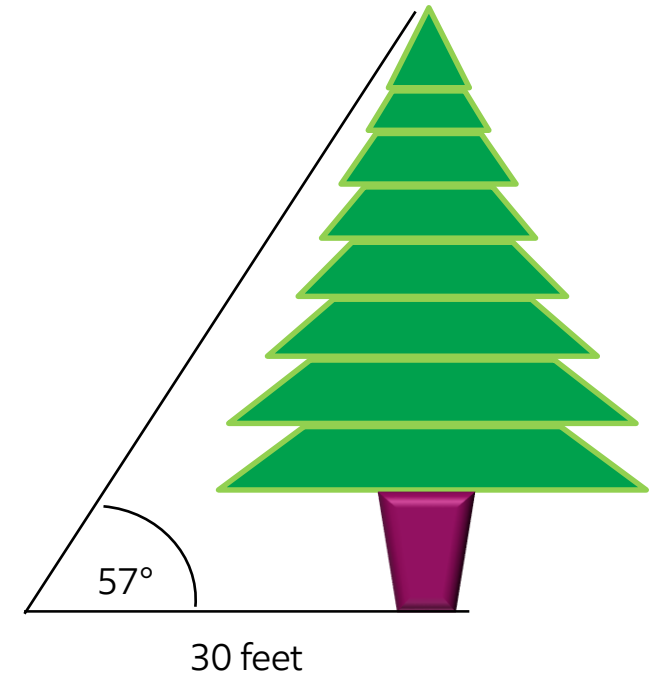
$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

$$\tan(57^\circ) = \frac{h}{30} \quad \text{Solve for } h.$$

$$h = 30 \tan(57^\circ) \quad \text{Multiply.}$$

$$h \approx 46.2 \quad \text{Use a calculator.}$$

The tree is approximately **46 feet tall.**



We hope you have a lovely Christmas and
a Happy New Year!



Best wishes

The ExxonMobil Fawley #SolveItWithSTEM Team!