Gatsby Benchmark 4

'Linking curriculum learning to careers'

Examples of the use of Mathematics

Curriculum area:	MATHEMATICS

Year 7/8

Autumn term	Spring term	Summer term
Number skills **Factors, multiples, primes, powers & roots** **Fractions, decimals and percentages** **Communication** – Students develop this core skill as they interact during group/shared work **Confidence** – developing Mathematical competence and numeracy will increase confidence **Problem solving** – finding solutions to Mathematical problems given in context Example activity linking curriculum learning to a career (how mechanics uses Maths) *Unfortunately Marty's fingers are too oily to press the buttons on his calculator!* abcw presents Marty is trying to tell a customer how much further she can drive before her next service. The service must take place after the car has done 50000miles and currently the odometer reads 49869.5miles. How many more times can the customer make her commute of 0.9 miles before the service?	**Perimeter, area and volume** **Angles** **Averages and range** **Representing data** **Teamwork** - Working together in search of solutions and accepting alternative methods as being valid **Initiative** – Opportunities to exercise and develop initiative when applying Mathematical principles to solving problems **Presentation** – presenting ideas for solutions to the rest of the group Example activity linking curriculum learning to a career (how an interior designer uses Maths) *Her last seven jobs paid:* £4000 £2000 £1500 £5000 £4000 £3500  Ingrid has recorded how much she has been paid for her last seven jobs. She wants the lowest average price to quote on her new website to attract more customers. Should she use the mean, median or mode in order to do this?	**Coordinates and straight line Graphs** **Ratio and proportion** **Sequences** **Probability** **Problem solving** – finding solutions to Mathematical problems given in context **Confidence** – developing Mathematical competence will increase confidence **Resilience** – recognising the common misconceptions in Mathematics and why they are logical Example activity linking curriculum learning to a career (how crime investigators use Mathematics) **Reading a Crime Scene Sketch** Now you be the detective! The shield from a knight's suit of armor has been stolen from the history museum. Use the crime scene sketch above to answer the questions. Points on a grid are called coordinates. When you name coordinates, you say the location on the horizontal axis first, then the location on the vertical axis. For example, in the sketch above, the glove is at coordinates (3, C). 1. Name the coordinates that tell where the flashlight is located. 2. Name the coordinates for the hammer. 3. What object is at (4, D)? 4. Where did the detectives find the baseball hat? Name the coordinates.

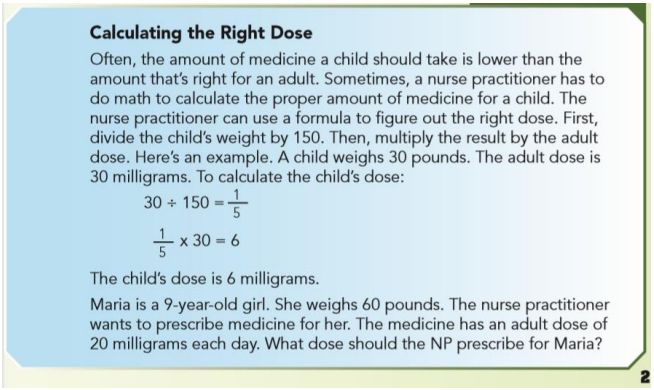
Year 9

Autumn term

Working with integers
Collecting, interpreting and representing data
Analysing data
Properties of integers
Working with fractions

Communication – Students develop this core skill as they interact during group/shared work
Confidence – developing Mathematical competence and numeracy will increase confidence
Resilience – recognising the common misconceptions in Mathematics and why they are logical

Example activity linking curriculum learning to a career (how nurses use Mathematics)



Calculating the Right Dose

Often, the amount of medicine a child should take is lower than the amount that's right for an adult. Sometimes, a nurse practitioner has to do math to calculate the proper amount of medicine for a child. The nurse practitioner can use a formula to figure out the right dose. First, divide the child's weight by 150. Then, multiply the result by the adult dose. Here's an example. A child weighs 30 pounds. The adult dose is 30 milligrams. To calculate the child's dose:

$30 \div 150 = \frac{1}{5}$

$\frac{1}{5} \times 30 = 6$

The child's dose is 6 milligrams.

Maria is a 9-year-old girl. She weighs 60 pounds. The nurse practitioner wants to prescribe medicine for her. The medicine has an adult dose of 20 milligrams each day. What dose should the NP prescribe for Maria?

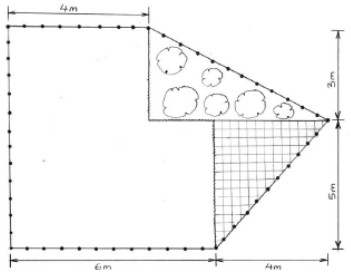
2

Spring term

Working with decimals
Basic algebra
Properties of polygons and 3D objects
Angles
Perimeter
Area

Teamwork - Working together in search of solutions and accepting alternative methods as being valid
Problem solving – finding solutions to Mathematical problems given in context
Confidence – developing Mathematical competence will increase confidence

Example activity linking curriculum learning to a career (how gardeners use Mathematics to calculate costs)



Paving is £6 per square metre
Planting is £12 per square metre
Turf is £4 per square metre

Fencing is £6 per metre
Brick walls are £15 per metre

Summer term

Rounding and estimating
Percentages
Powers and roots
Standard Form
Further algebra

Communication – Students develop this core skill as they interact during group/shared work
Resilience – recognising the common misconceptions in Mathematics and why they are logical
Problem solving – finding solutions to Mathematical problems given in context

Example activity linking curriculum learning to a career (how dentists use Mathematics)

Extension: can you write this distance in nanometres?

abcw presents

Derek is producing a report which details the dimensions of the average human tooth. He reads that the average width of a nerve is 7×10^{-7}m, but isn't sure that his readers understand standard form. What would this distance be in ordinary form?

Year 10 - Foundation

Autumn term

Powers and roots
Standard form
Further algebra
Equations
Functions and sequences
Basic probability

Teamwork - Working together in search of solutions and accepting alternative methods as being valid
Problem solving – finding solutions to Mathematical problems given in context
Resilience – recognising the common misconceptions in Mathematics and why they are logical

Example activity linking curriculum learning to a career (how scientists use Mathematics)

The table shows the mass of the major planets in the Solar System.
The mass of the Sun is 1.989×10^{30} kg.

a Which mass is not in standard form? Convert this mass to standard form.
b About how many times bigger than the total mass of the planets is the Sun? Show your working.

Planet	Mass (kg)
Mercury	3.3×10^{23}
Venus	4.87×10^{24}
Earth	5.98×10^{24}
Mars	6.5×10^{23}
Jupiter	1.9×10^{27}
Saturn	5.7×10^{26}
Uranus	8.7×10^{25}
Neptune	100×10^{24}

Spring term

3D objects
Units and measure
Formulae
Volume and surface area
Further probability

Communication – Students develop this core skill as they interact during group/shared work
Confidence – developing Mathematical competence and numeracy will increase confidence
Resilience – recognising the common misconceptions in Mathematics and why they are logical

Example activity linking curriculum learning to a career (how engineers use Mathematics)

Conversion Factors:
1 mile = 1.6 km
1 pint = 0.568 litres
1 inch = 2.54 cm
1 kg = 2.2 lbs

abcw presents

Egbert's American customer has sent him a specification for a new bridge which they want to span a gorge of 200 feet. Egbert's computer software uses metres, but he knows that one foot is 12 inches. How long does the bridge need to be in metres?

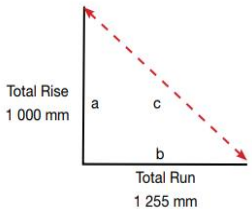
Summer term

Inequalities
Ratio
Proportion
Graphs of linear functions
Pythagoras' theorem
Trigonometry

Teamwork - Working together in search of solutions and accepting alternative methods as being valid
Initiative – Opportunities to exercise and develop initiative when applying Mathematical principles to solving problems
Presentation – presenting ideas for solutions to the rest of the group

Example activity linking curriculum learning to a career (how carpenters use Mathematics)

Carpenters perform calculations to help them lay out and construct wooden stairs. Calculate the length of the stringer (c) for the stairs shown below.



Year 10 - Higher

Autumn term

Equations
Functions and sequences
Surds
Basic probability
3D objects
Units and measure

Initiative – Opportunities to exercise and develop initiative when applying Mathematical principles to solving problems
Teamwork - Working together in search of solutions and accepting alternative methods as being valid
Communication – Students develop this core skill as they interact during group/shared work

Example activity linking curriculum learning to a career (how opticians use Mathematics)

Conversion Factors:
1mile = 1.6km
1pint = 0.568litres
1inch = 2.54 cm
1kg = 2.2lbs

abcw presents

The height of the letters on Ollie's test chart, which has been used for decades, are measured in inches. Unfortunately, when he now sends in a patients prescription he needs to report the smallest letters they can read in mm. His patient can only read letters which are 0.5 inches tall, so what should he report in mm in order to get the correct prescription?

Spring term

Formulae
Volume and surface area
Further probability
Inequalities
Ratio

Teamwork - Working together in search of solutions and accepting alternative methods as being valid
Problem solving – finding solutions to Mathematical problems given in context
Resilience – preserving with problem solving questions
Initiative – Opportunities to exercise and develop initiative when applying Mathematical principles to solving problems

Example activity linking curriculum learning to a career (how financial advisors use Mathematics)

FV=Future value
PV=Present value
r= interest rate
n= number of years invested

Florence uses the following formula to calculate the future value of her customers investments. Rearrange the formula to calculate the interest rate a customer would need in order to ensure he had a definite future value.

$$FV = PV(1+r)^n$$

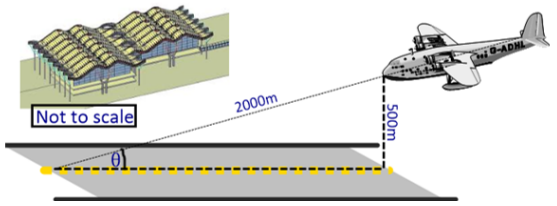
Summer term

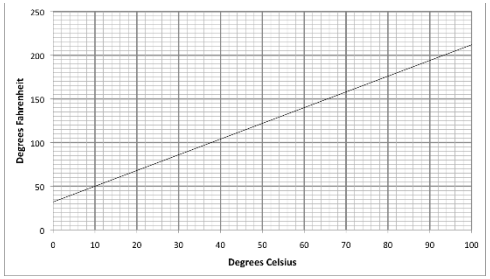
Proportion
Graphs of linear functions
Interpreting graphs
Circles
Pythagoras' theorem
Trigonometry

Initiative – Opportunities to exercise and develop initiative when applying Mathematical principles to solving problems
Problem solving – finding solutions to Mathematical problems given in context
Presentation – presenting ideas for solutions to the rest of the group

Example activity linking curriculum learning to a career (how pilots use Mathematics)

A passenger aeroplane flying into an airport and it's going to land. It needs to have an angle of elevation of between 13° and 17° (from horizontal flight) to ensure it lands safely on the runway. Does this plane need to make any adjustments to land safely?



Year 11		
Autumn term	**Spring term**	**Summer term**
Interpreting graphs **Vector geometry** **Transformations in a plane** **Constructions and loci** **Similarity** **Congruence** **Teamwork** - Working together in search of solutions and accepting alternative methods as being valid **Presentation** – presenting ideas for solutions to the rest of the group Example activity linking curriculum learning to a career (how bakers use Mathematics) Boris is an excellent baker, famed for his delicious buns. He has been hired to bake for an important charity event at a posh hotel in London. There is one issue. All his recipes are in degrees Fahrenheit but the hotel's oven works in degrees Celsius.  	**Graphs of other functions and equations** **Growth and decay** **Transformations of curves** **Problem solving** – finding solutions to Mathematical problems given in context **Resilience** – preserving with problem solving questions **Initiative** – Opportunities to exercise and develop initiative when applying Mathematical principles to solving problems **Presentation** – presenting ideas for solutions to the rest of the group Example activity linking curriculum learning to a career (how biologists use Mathematics) **Activity C** This activity brings ideas of how populations of organisms can grow according to an exponential rule. There are many examples of how exponential growth can occur in populations; bacteria growth is the obvious example. In this activity we look at rabbit populations and different models used to estimate the population growth. There are initially 10 rabbits in a field. A number of models are proposed to model their growth which learners are going to investigate.	