1st November

(3y + 5)(y - 2) + ay + b \equiv 3y^2 + y - 4

Find the values of a and b

<table>
<thead>
<tr>
<th>Pink</th>
<th>Blue</th>
<th>Red</th>
<th>Green</th>
</tr>
</thead>
</table>

Work out the angle of the green sector

The fair spinner above is spun twice.

The probability of getting two greens is \( \frac{4}{25} \)

The spinner is spun another three times.
Work out the probability of obtaining one green and two blues.

A sequence of numbers is formed by the iterative process of

\[
\begin{align*}
a_{n+1} &= (a_n)^3 - (a_n)^2 \\
a_1 &= 2
\end{align*}
\]

Find \( a_3 \)

Write in the form \( a\sqrt{b} \)

\[
\sqrt{27} + \frac{18}{\sqrt{3}}
\]
<table>
<thead>
<tr>
<th>2nd November</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helen says that the cosine of an angle is $-1$.</td>
</tr>
<tr>
<td>Write down three possible angles</td>
</tr>
<tr>
<td>Solve the simultaneous equations</td>
</tr>
<tr>
<td>$x^2 + y^2 = 5$</td>
</tr>
<tr>
<td>$2x + y - 5 = 0$</td>
</tr>
<tr>
<td>For all values of $x$</td>
</tr>
<tr>
<td>$f(x) = \frac{2x + 1}{4}$</td>
</tr>
<tr>
<td>Find $f^{-1}(x)$</td>
</tr>
<tr>
<td>The graph with equation $y = x^3$ is translated by the vector $\left(\begin{array}{c} -1 \ 0 \end{array}\right)$</td>
</tr>
<tr>
<td>Write down the equation of the translated graph</td>
</tr>
<tr>
<td>The universal set contains the whole numbers 1 to $n$.</td>
</tr>
<tr>
<td>$n$ is an odd number greater than 200.</td>
</tr>
<tr>
<td>$O$ is the set of odd numbers</td>
</tr>
<tr>
<td>$P$ is the set of prime numbers</td>
</tr>
<tr>
<td>How many numbers are in $O \cup P$?</td>
</tr>
</tbody>
</table>
### 3rd November

#### Find the area of the triangle in terms of \( x \).

**Diagram:**
- Triangle with sides 20 and \( x \), angle 30°.

#### Given

\[
y = \frac{3\sqrt{2}}{2}
\]

Write an expression for \( y^3 \).

#### Find the acceleration for the first 10 seconds of the journey.

**Graph:**
- Speed (m/s) vs. Time (seconds).
- Speed increases from 0 to 11 m/s in 10 seconds, then remains constant at 11 m/s until time \( t \), where speed decreases to 8 m/s.

The average speed from 0 to \( t \) seconds was 8.725 m/s.

#### Find the \( n \)th term of the sequence

9 10 13 18 25 \( \ldots \)
There are \(x\) apples in a crate. 4 of the apples are bad.

Fiona chooses two apples from the crate, without replacement. The probability she selects two bad apples is \(\frac{1}{11}\)

Find \(x\), the number of apples in the crate.
Work out

\[ 27^{\frac{2}{3}} \times 2^{-3} \]

giving your answer as a decimal

Here is a velocity/time graph for the first 12 seconds for a particle

Calculate an estimate for the acceleration of the particle at 6 seconds.

Calculate an estimate for the distance travelled by the particle in the first 12 seconds.

Calculate an estimate for the average velocity of the particle over the first 12 seconds.

Calculate an estimate for the average acceleration over the first 4 seconds.
<table>
<thead>
<tr>
<th><strong>6th November</strong></th>
<th></th>
<th><strong>Corbettmaths</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Find the equation of AB</strong></td>
<td><strong>[ \overrightarrow{AB} = \left( \frac{2}{4} \right) ]</strong></td>
<td>Write down a vector that is perpendicular to AB and the same length</td>
</tr>
<tr>
<td><strong>Find the equation of AB</strong></td>
<td></td>
<td><strong>Find the coordinates of the point A</strong></td>
</tr>
<tr>
<td>Shown are the straight lines AB and CD. M is the midpoint of CD. AB is perpendicular to CD and passes through the point M. C is the point (0, 12) and D is the point (6, 0)</td>
<td>B is the point (11, 10) (AM:MB = 5:2)</td>
<td><strong>Find the coordinates of the point A</strong></td>
</tr>
<tr>
<td>A bag contains 15 sweets. 9 sweets are red. 4 sweets are yellow. 2 sweets are green. Two sweets are taken from the bag without replacement.</td>
<td>Work out the probability that the two sweets are same colour.</td>
<td></td>
</tr>
<tr>
<td>Solve the simultaneous equations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(x - 7 = 2y)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(x^2 + 4y^2 = 37)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7th November

Describe fully a single transformation for which there are two invariant points.

Find the volume of the composite shape, made from two pyramids.

Solve
\[
\frac{2}{x - 5} - \frac{2}{x - 4} = 1
\]

Solve
\[12x^2 - 5x - 2 \geq 0\]

Estimate the total distance travelled. Is your estimate an underestimate or overestimate?
### 8th November

**Show**

\[ 2x^3 + 3x^2 - 4x + 7 = 0 \]

has a solution between \(-3\) and \(-2\)

---

A particle travels 140m in 6.4 seconds. Both measurements are given to 2 significant figures.

Find the upper bound for the speed of the particle

---

The triangle below has an area of \(2\sqrt{6}\text{cm}^2\)

Find the height of the triangle, \(x\).

Give your answer as a simplified surd.

---

<table>
<thead>
<tr>
<th>Pulse (beats per min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>80</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>40</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

---

Work out the rate at which the pulse is increasing at four minutes.

Include units.

---

Work out the rate at which the pulse is decreasing at six minutes.

Include units.
### 9th November

Show \( x^2 - 7x + 1 = 0 \) can be rearranged to the form

\[
x = 7 - \frac{1}{x}
\]

Use the iteration

\[
x_{n+1} = 7 - \frac{1}{x_n}
\]

to find an approximation solution to \( x^2 - 7x + 1 = 0 \)

Start with \( x_1 = 1 \)

Find the coordinates of the point B

Shown is a circle, centre O. A and B are points on the circle. AC and BC are tangents.

Find the coordinates of the point C

Write \( x^2 + 6x + 21 \) in the form \( (x + a)^2 + b \)

Find the turning point of the graph \( y = x^2 + 6x + 21 \)
### 10th November

**The square of w is 3**

Write down the value of \( w^3 \)

---

**Given**

\[
f(x) = 4x + 1 \\
g(x) = 5 - 2x
\]

Find \( gf(5) \)

---

**Diagram:**

There are 100 students in a college  
\( B = \) number of students studying biology  
\( P = \) number of students studying physics

A half of the students who study biology also study physics. The number of students who study physics is 50% more than those studying biology.

Find \( x \).

---

**Simplify fully**

\[
\frac{x^3 - x}{x + 2} \div \frac{x^2 - x}{x^2 - 5x - 14}
\]
11th November

Solve

\[ 3x^2 - 3 > 4x + 1 \]

Find \( x \)

Write \( 18\cos30^\circ + 2\tan60^\circ \) in the form \( a\sqrt{b} \)

The population of an island is decreasing exponentially.

Martin has begun to monitor the population each year.
Year 6 - Population 3000
Year 8 - Population 2000

What was the population in Year 2?

Find the coordinates of the points where the circle \( x^2 + y^2 = 8 \) and the line \( y = 2x + 2 \) intersect.
Jim picks a five digit odd number.
The second digit is less than 8.
The fourth digit is a positive square number
The first digit is a prime number.

How many different numbers could he pick?

The area of a rectangle is \(\sqrt{125}\) cm\(^2\)
The length of the rectangle is \((2 + \sqrt{5})\) cm.

Calculate the width of the rectangle.

Express your answer in the form \(a + b\sqrt{5}\), where \(a\) and \(b\) are integers.

Sketch the graph of \(y = \sin x\) for \(0 \leq x \leq 360\).
13th November

The curve $y = x^2 + 3x - 10$ is reflected in the y-axis.

Write down the equation of the reflected curve.

The town Milton is 15 miles due East from the town Newtown.

A helicopter is on a bearing of $150^\circ$ from Newtown and a bearing of $240^\circ$ from Milton.

A helipad is 3 miles due South of Newtown.

Work out the shortest distance from the helicopter to the helipad.

| Sketch $y = f(x + 1)$ | Prove that the angle in a semi-circle is always $90^\circ$ |
### 14th November

**Solve the simultaneous equations**

\[
x + y = 1
\]

\[
16x^2 + y^2 = 65
\]

**Work out in its simplest form**

\[(4 + \sqrt{5})(4 - \sqrt{5})\]

**Work out**

\[
\left(1 \frac{9}{16}\right)^{-\frac{3}{2}}
\]

**The approximate solution to an equation is found by using the iterative process**

\[
x_{n+1} = \frac{(x_n)^3 - 7}{10}
\]

using \(x_1 = -1\)

**Find**

\(x_2\)

**Work out the solution to 4 decimal places**
Show

\[ x^4 - 7x^3 = 6 \]

has a solution between 7 and 8

Prove that the product of two consecutive even numbers is a multiple of 4.

Solve \[ 3x^2 - 19x - 14 < 0 \]

Show DE is parallel to MN

ODE is a triangle
M is the midpoint of OD
N is the midpoint of OE

\[ \overrightarrow{OM} = a \]
\[ \overrightarrow{ON} = b \]
### 16th November

<table>
<thead>
<tr>
<th>Make a the subject</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{a}{n} - \frac{w}{c} = \frac{a - w}{p} )</td>
<td></td>
</tr>
</tbody>
</table>

| After a reduction of 4% in the original price, a motorbike is sold for £800. Both of these values are correct to one significant figure. | Calculate the greatest possible original price before the reduction was applied. |

| Prove the product of two consecutive integers is always even. |  |

| Sketch the graph of \( f(x) = -x^2 - 2x + 10 \) showing the coordinates of the turning points and the coordinates of any intercepts with the coordinate axes. |  |
### 17th November

#### Sketch the graph of \( y = \cos x \) for \( 0 \leq x \leq 360 \).

![Graph](image)

#### Express in the form \( a\sqrt{b} \)

\[
\frac{30}{\sqrt{6}}
\]

#### Solve

\[
x + y - 4 = 0
\]
\[
y^2 - 5 = 4x
\]

#### Solve

\[
3x^2 + 5x - 105 < 2x^2 - 3x
\]

#### A sphere has radius \( c \)

A hemisphere has radius \( d \).

The volume of the hemisphere is twice the volume of the sphere.

\[
\frac{d}{c}
\]

© Corbettmaths 2016

www.corbettmaths.com
### 18th November

**Simplify fully**

\[
\frac{3x^2 + 20x - 7}{16x^2 - 1} \div \frac{x + 7}{4x + 1}
\]

<table>
<thead>
<tr>
<th>The two sectors have the same area. Find x</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In the diagram, the lines CE and DF intersect at G. CD and FE are parallel and CD = FE. Prove that triangles CDG and EFG are congruent.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The curve C has equation ( y = x^2 + ax + b )</th>
</tr>
</thead>
<tbody>
<tr>
<td>The minimum point of C has coordinates ((-4, 6))</td>
</tr>
<tr>
<td>Find a and b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prove that when two consecutive integers are squared, that the difference is equal to the sum of the two consecutive integers.</th>
</tr>
</thead>
</table>

© Corbettmaths 2016  
[www.corbettmaths.com](www.corbettmaths.com)
19th November

Factorise fully

\[(x + 2)^4 - (x - 3)(x + 2)^2\]

<table>
<thead>
<tr>
<th>Area = 1m²</th>
</tr>
</thead>
</table>

Shown is a regular hexagon. Find \(x\)

<table>
<thead>
<tr>
<th>Velocity (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 10 20 30 40 50 60</td>
</tr>
<tr>
<td>0 2 4 6 8 10 14</td>
</tr>
</tbody>
</table>

Calculate an estimate for the acceleration after 40 seconds

Here is a velocity time graph for the first 60 seconds of a journey.

Calculate an estimate for the total distance travelled in the 60 seconds.

<table>
<thead>
<tr>
<th>Both shapes have the same volume. Express (r) in terms of (x).</th>
</tr>
</thead>
</table>

© Corbettmaths 2016

www.corbettmaths.com
### 20th November

<table>
<thead>
<tr>
<th>Write down the exact value of $\sin 150^\circ$</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$(ax + 1)(x - 3)(x + b) = 2x^3 - 3x^2 - 8x - 3$ Find $a$ and $b$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculate the length $BD$</td>
<td></td>
</tr>
<tr>
<td>Calculate the area of $ABCD$</td>
<td></td>
</tr>
<tr>
<td>Charlotte and Ben invest money for 4 years. Charlotte’s bank paid 4% interest for the first year and then 1% interest for the other years. Ben’s bank pays the same percentage interest each year.</td>
<td>The invest the same amount of money and have the same amount of money at the end of 4 years. Work out the percentage interest that Ben’s bank pays.</td>
</tr>
</tbody>
</table>

© Corbettmaths 2016  
www.corbettmaths.com
21st November

Solve

\[ x^2 > 7x + 18 \]

Two barrels are mathematically similar. It takes 80ml of paint to paint the smaller barrel. How much paint is needed for the larger barrel.

<table>
<thead>
<tr>
<th>Age (A years)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 ≤ A ≤ 25</td>
<td>145</td>
</tr>
<tr>
<td>25 ≤ A ≤ 30</td>
<td>200</td>
</tr>
<tr>
<td>30 ≤ A ≤ 35</td>
<td>94</td>
</tr>
<tr>
<td>35 ≤ A ≤ 40</td>
<td>141</td>
</tr>
<tr>
<td>40 ≤ A ≤ 45</td>
<td>294</td>
</tr>
<tr>
<td>45 ≤ A ≤ 50</td>
<td>326</td>
</tr>
</tbody>
</table>

Calculate an estimate of the upper quartile.

Shown is a right angled triangle. Find the possible value(s) of \( x \).

Solve the simultaneous equations

\[ x - y = 3 \]
\[ x^2 + y^2 = 89 \]
### 22nd November

The events A and B are mutually exclusive.

\[ P(A) = 0.7 \]
\[ P(B) = 0.2 \]

**Find \( P(A \cap B) \)**

**Calculate the volume of the frustum**

**Write down the equation of the circle shown in the form:**

\[ x^2 + y^2 + ax + by + c = 0 \]

**ABC and ABD are right angled triangles. ADC is a straight line.**

**Prove ABC and BCD are similar triangles.**

**The line \( l \) is a tangent to the circle**

\[ x^2 + y^2 = 90 \]

at the point P.

P is the point (3, 9)

The line \( l \) crosses the x-axis at the point Q.

**Work out the area of triangle OPQ.**
## 23rd November

Find 
\[ \frac{16^{2x+3}}{4^x} = 32 \]

The Line L passes through (1, 6) and (2, 1).

Find the equation of the line P, perpendicular to L, which passes through (6, -4)

Find the coordinates of the point of intersection of the lines L and P

Find the nth term of 
\[-10, -7, -2, 5, \ldots\]

Prove algebraically that 
\[(4n + 1)^2 - (2n - 1)\] is an even number for all positive integer values of n.
### 24th November

**Shown is** $y = f(x)$

**Sketch** $y = f(-x)$

**Sketch** $y = -f(x)$

**Prove** $\triangle AFE$ and $\triangle BCF$ are congruent

**Prove** $\triangle ADB$ is isosceles

**Prove algebraically that**

$$(4n + 1)^2 - (2n - 1)$$

is an even number for all positive integer values of $n$. 

---

© Corbettmaths 2016  
www.corbettmaths.com
25th November

Solve

\[
\frac{81^x}{9^{x+1}} = 3\sqrt{3}
\]

Write down the equation of the curve shown.

Write \(x^2 - 6x + 1\) in the form \((x + a)^2 + b\), where \(a\) and \(b\) are integers to the form.

Write 3.418181818… as a fraction.

C and D are two independent events

\[P(C) = 0.8\]
\[P(D') = 0.1\]

Find \(P(C \cup D)\)
### 26th November

n is the set of even numbers from 1 to 200

O is the set of odd numbers

P is the set of prime numbers

C is the set of cube numbers

S is the set of square numbers

<table>
<thead>
<tr>
<th>How many numbers are there in the set $O \cup P \cup C \cup S$</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>The area of an ellipse, width $a$ and height $b$ is given by</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A = \frac{\pi ab}{4}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Find the shaded area.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12 cm</strong></td>
</tr>
<tr>
<td><strong>7 cm</strong></td>
</tr>
</tbody>
</table>

| Prove $(2n + 1)^2 - (2n + 1)$ is always an even number for all positive values of $n$. |

<table>
<thead>
<tr>
<th>Mrs Jenkins is making decorations for a wedding.</th>
</tr>
</thead>
<tbody>
<tr>
<td>She needs $18\sqrt{5}$ metres of ribbon in total.</td>
</tr>
<tr>
<td>Mrs Jenkins has 40 metres of ribbon.</td>
</tr>
<tr>
<td>Does she have enough ribbon?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The point $A$ has coordinates $(-6,0)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>The point $B$ has coordinates $(0,3)$</td>
</tr>
<tr>
<td>The point $C$ has coordinates $(9,-1)$</td>
</tr>
</tbody>
</table>

| Find the equation of the line that passes through $C$ and is perpendicular to $AB$. |

© Corbettmaths 2016  
www.corbettmaths.com
### 27th November

**Express** $x^2 + 8x + 40$ in the form $(x + a)$

The volume of the cone is twice the volume of the sphere.
Express $h$ in terms of $y$.

Sketch the graph of $y = -\sin x$ for $0 \leq x \leq 360$.

Given that $a = \sqrt{3}$ and $b = \sqrt{48}$ find the value of $a^2$ show that $(a + b)^2 = 75$

There are 20 sweets in a box. There are $y$ chocolate sweets and the rest of the sweets are mints.

Florence takes out two sweets, at random, from the box.

Find an expression, in terms of $y$, for the probability that Florence takes one sweet of each flavour.
28th November

<table>
<thead>
<tr>
<th>Solve the simultaneous equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ 9^x \times 27^{2-y} = 3\sqrt{3} ]</td>
</tr>
<tr>
<td>[ 3x + 2y = 3 ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expand and simplify ( (3 + \sqrt{8})(4 + \sqrt{2}) )</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>HIJK is a triangle based pyramid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The base HIJ is an equilateral triangle</td>
</tr>
<tr>
<td>with side 10cm.</td>
</tr>
<tr>
<td>The volume of the pyramid is 300cm³.</td>
</tr>
<tr>
<td>Calculate the perpendicular height, ( h ), of</td>
</tr>
<tr>
<td>the pyramid.</td>
</tr>
</tbody>
</table>

| The point \((-6, -7)\) is the turning  |
| point of the graph \( y = x^2 + ax + b \)  |
| Find a and b |

| C and D are two independent  |
| events  |
| P(C) = 0.6  |
| P(D') = 0.3  |
| Find P(C∩D)  |
### 29th November

If \( f(x) = 4x^{2/3} - x^{-1} \)

find \( f(8) \)

Show \( x^2 - 7x + 1 = 0 \) can be rearranged to the form

\[
x = 7 - \frac{1}{x}
\]

Use the iteration

\[
x_{n+1} = 7 - \frac{1}{x_n}
\]

to find an approximation solution to \( x^2 - 7x + 1 = 0 \)

Start with \( x_1 = 1 \)

A group of scientists want to estimate the number of eels in a lake. They catch and ring 200 eels. They return the 200 eels to the lake. They then catch 500 fish. Of these, 18 are ringed.

Estimate the number of eels in the lake.

The first 5 triangular numbers are

1, 3, 6, 10, 15

by considering the nth term, find the 100th triangular number
### 30th November

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Solve $x^2 - 5x + 4 &lt; 0$</th>
<th>Area of shaded square</th>
<th>Solve $\frac{4}{x + 1} + \frac{2}{x - 2} = 3$</th>
<th>Volume of pyramid</th>
</tr>
</thead>
<tbody>
<tr>
<td>One invariant point</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The midpoints of the sides of a square of side 16cm are joined to form another square. This process is then repeated to create the shaded square.

Find the area of the shaded square.

An octagonal pyramid has a base that is a regular octagon with side length 20cm. The perpendicular height of the pyramid is 75cm.

Find the volume of the pyramid.