1st October

Solve \( x^2 - 2x - 15 > 0 \)

\[
f(x) = 4x + 3
\]

Find \( f^{-1}(x) \)

A bag contains 4 red sweets and 5 green sweets.

Kelly removes 3 sweets, one at a time, without replacement.

Find the probability that she does not choose 3 sweets that are the same colour.

Calculate an estimate of the interquartile range

<table>
<thead>
<tr>
<th>Time taken ( \leq ) 10</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ t ≤ 10</td>
<td>135</td>
</tr>
<tr>
<td>10 ≤ t ≤ 20</td>
<td>244</td>
</tr>
<tr>
<td>20 ≤ t ≤ 30</td>
<td>555</td>
</tr>
<tr>
<td>30 ≤ t ≤ 50</td>
<td>106</td>
</tr>
<tr>
<td>50 ≤ t ≤ 100</td>
<td>20</td>
</tr>
</tbody>
</table>

Find the shortest possible distance between the line \( y = 3x + 5 \) and the origin.
2nd October

Given

\[ f(x) = 5x - 3 \]
\[ g(x) = 2x + 1 \]

Find

\[ fg(x) \]

Describe a transformation such that one vertex is invariant.

Describe a transformation such that two vertices are invariant.

Shown is a triangle with points (1, -1), (3, -1) and (1, -3)

Find the smallest angle in a triangle whose sides have lengths 4cm, 7cm and 8cm.

\[ \xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16\} \]

A = prime numbers
B = factors of 28

(a) Complete the Venn diagram
One of the numbers is selected at random.

(b) Write down \( P(B \mid A) \)
### 3rd October

Ship B is 7km, on a bearing of 022°, from Ship A. Ship C is located on a bearing of 070° from Ship A and on a bearing of 135° from Ship B.

Work out the distance of Ship C from Ship B.

![Diagram](image)

Prove the opposite angles in a cyclic quadrilateral add to 180°

Work out the nth term for the sequence

3, 9, 17, 27, 39 …

Find the 20th term in the sequence

Expand and simplify

\((3 + \sqrt{2})^3\)

Calculate the area of the segment

![Diagram](image)
<table>
<thead>
<tr>
<th>Date</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th October</td>
<td>Write 1.5238238238… as a simplified fraction.</td>
</tr>
<tr>
<td></td>
<td>Find the possible values of x.</td>
</tr>
<tr>
<td></td>
<td>Express $\sqrt{8} + \sqrt{18}$ in the form $a\sqrt{2}$</td>
</tr>
<tr>
<td></td>
<td>Express $x^2 - 8x + 16$ in the form $(x - p)^2 + q$, where $p$ and $q$ are integers</td>
</tr>
<tr>
<td></td>
<td>State the coordinates of the minimum point of the curve with equation $y = x^2 - 8x + 16$</td>
</tr>
</tbody>
</table>
5th October

<table>
<thead>
<tr>
<th>A circle has a radius of 3 and centre (0, 0)</th>
<th>Write down the equation of the circle.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve $2x^2 - 7x + 3 &lt; 0$</td>
<td></td>
</tr>
<tr>
<td>Two students are chosen at random.</td>
<td>Work out the probability that both students take less than 5 minutes to travel to school.</td>
</tr>
<tr>
<td>The histogram shows information about the time taken to travel to school by students.</td>
<td></td>
</tr>
<tr>
<td>Prove that if two consecutive integers are squared, that the sum always gives a remainder of 1 when divided by 4.</td>
<td></td>
</tr>
</tbody>
</table>
6th October

Simplify
\[
\frac{\sqrt{48} + \sqrt{75}}{\sqrt{3}}
\]

125 - \frac{2}{3}

Triangle BCD are such that BC = 3.9cm, CD = 7.2cm and \( \angle BDC = 30° \)

Work out the possible values of the largest angle.

The first five terms of a linear sequence are 5, 11, 17, 23, 29 …

(a) Find the nth term of the sequence

A new sequence is generated by squaring each term of the linear sequence and then adding 5.

(b) Prove that all terms in the new sequence are divisible by 6.
7th October

Calculate angle BDF

In a class of 30 students
15 students play the piano
19 students play the guitar
8 students play neither instrument.

Represent this information on a Venn diagram

A student is selected at random.
Given the student plays the piano, work out the probability that they do not play the guitar.

A square based pyramid 1 is divided into two parts: a square based pyramid 2 and a frustum 3, as shown.

Calculate the volume of frustum 3.

Pyramid 1 has a base of side length 12cm.
Pyramid 2 has a base of side length 4cm.
The perpendicular height of pyramid 1 is 15cm.
A circle has equation $x^2 + y^2 = 64$

Find the circumference of the circle

A helicopter leaves town A and flies 8km due North to town B. The helicopter then flies on a bearing of 105° for 15km until it reaches town C.

Calculate the direct distance from town A to town C.

Work out $(\sqrt{8} + \sqrt{12})^2$

$a$ is directly proportional to $\sqrt{c}$.

$w$ is inversely proportional to $a^3$.

When $c = 49$, $a = 35$
When $a = 2$, $w = 16$.

Find the value of $w$ when $c = 4$. 

© Corbettmaths 2016  
www.corbettmaths.com
9th October

Sketch

\[ y = 2^x \]

A remote control car drives in a straight line.
It starts from rest and travels with constant acceleration for 20 seconds reaching a velocity of 12 m/s. It then travels at a constant speed for 10 seconds. It then slows down with constant deceleration of 1.5 m/s².

Draw a velocity-time graph and work out the total distance travelled.

The line AB has equation \(4x + 3y = 9\)
Find an equation of the line perpendicular to the line AB that passes through the point \((-3, -1)\)

Two identical small circles are drawn inside a large circle.
What percentage of the large circle is shaded?
10th October

Write down the exact value of $\tan 30^\circ + \tan 60^\circ$

$\tan 30^\circ = \frac{1}{\sqrt{3}}$  
$\tan 60^\circ = \sqrt{3}$

$$\tan 30^\circ + \tan 60^\circ = \frac{1}{\sqrt{3}} + \sqrt{3}$$

ABC is a triangle.  
M lies on BC such that $BM = \frac{3}{4} BC$

Solve the simultaneous equations

$x^2 + y^2 = 13$  
$x - 2y = 1$

Find $x$  

Express $\overrightarrow{AM}$ in terms of $x$ and $y$

Shown is sector OAB of circle centre O.  
OA and OB are joined to make a cone.  
Calculate the volume of the cone.
### 11th October

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which region is shown in yellow?</td>
<td>![Venn Diagram]</td>
</tr>
<tr>
<td><strong>A</strong> <strong>A'</strong> <strong>B</strong> <strong>B'</strong></td>
<td></td>
</tr>
<tr>
<td>Work out the nth term of the sequence 8, 11, 16, 23, 32 …</td>
<td></td>
</tr>
<tr>
<td>The ratio of Matt's age to Paul's age is x:y</td>
<td></td>
</tr>
<tr>
<td>Two years ago, the ratio of their ages was 5:8</td>
<td></td>
</tr>
<tr>
<td>In three years time, the ratio of their ages will be 2:3</td>
<td></td>
</tr>
<tr>
<td>Express x:y in its lowest terms</td>
<td></td>
</tr>
<tr>
<td>The distance between ((-3, a)) and ((5, 1)) is 17 units.</td>
<td></td>
</tr>
<tr>
<td>Find two possible values for a.</td>
<td></td>
</tr>
<tr>
<td>The numbers m and n are irrational and are not the same.</td>
<td></td>
</tr>
<tr>
<td>m + n is rational</td>
<td></td>
</tr>
<tr>
<td>Write down possible values for m and n</td>
<td></td>
</tr>
</tbody>
</table>

© Corbettmaths 2016  
www.corbettmaths.com
12th October

The diagram shows the circle $x^2 + y^2 = 40$ with a tangent at the point $(2, 6)$

<table>
<thead>
<tr>
<th>Find the gradient of the line OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find the gradient of the tangent</td>
</tr>
<tr>
<td>Find the equation of the tangent</td>
</tr>
</tbody>
</table>

There are 25 beads in a bag. There are only pink and green beads in the bag.

Jonah picks two beads at random, without replacement.

The probability that he picks two pink beads is 0.4

<table>
<thead>
<tr>
<th>Solve $2w^{\frac{1}{4}} - 14 = 0$</th>
</tr>
</thead>
</table>

| Evaluate $(2^{\frac{7}{9}})^{\frac{1}{2}}$ |

Work out the probability that Jonah picks two green beads.
### 13th October

**What are the coordinates of the new position of P when the graph \( y = f(x) \) is transformed to the graph of \( y = -f(x) \)?**

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

**A circle, centre (0, 0) has a circumference of \( 16\pi \).**

Work out the equation of the circle.

**The turning point of the graph \( y = x^2 + ax + b \), where \( a \) and \( b \) are integers is (5, -2).**

Find \( a \) and \( b \).

**In triangle CDE, CD = (x + 1)cm, DE = (x + 3)cm and CE = 5cm. Angle CDE = 60°.**

Calculate \( x \) to 2 decimal places.
14th October

A straight line passes through the points \((m, n)\) and \((p, q)\) where

\[ p = m + 8 \]
\[ n = q - 10 \]

Find the gradient of the line

Show the equation
\[ x^2 + 10x = 35 \]
has a solution between 2 and 3.

Show the equation
\[ x^2 + 10x = 35 \]
can be rearranged to give
\[ x = \frac{7}{2} - \frac{x^2}{10} \]

Starting with \(x_0 = 2\)
use the iteration formula
\[ x_{n+1} = \frac{7}{2} - \frac{x_n^2}{10} \]
four times to find an estimate for the solution of
\[ x^2 + 10x = 35 \]

Prove the angles in the same segment are equal.
Conor says

\[ \cos(45^\circ) = \frac{1}{\sqrt{2}} \]

Is he correct?

10% of the people scored less than \( x \) marks

Find \( x \)

5% of people scored more than \( y \) marks.

Find \( y \)

260 people sit a driving theory test. Their results are shown in this histogram.

The sketch shows a curve with equation \( y = ab^x \) where \( a \) and \( b \) are constants and \( b > 0 \)

The curve passes through the points (1, 14) and (4, 112)

Calculate the value of \( a \) and \( b \)

Express \( y \) in terms of \( x \).

The triangle and circle have the same area.
### 16th October

**Given**

\[ f(x) = 5x - 3 \]
\[ g(x) = 2x + 1 \]

**Find**

\[ gf(x) \]

<table>
<thead>
<tr>
<th>Speed (m/s)</th>
<th>Calculate the distance between the stations</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Speed-Time Graph" /></td>
<td></td>
</tr>
</tbody>
</table>

The speed-time graph shows the speed of a train between two underground stations.

**Calculate the average speed for the journey**

**Solve**

\[
\frac{2}{x + 1} - \frac{10}{x + 4} = -1
\]

**Find**

The shortest possible distance between the line \( y = 5x \) and the point \((-3, 10)\).
### 17th October

m is inversely proportional to $x^2$

when $m = 3$, $x = 5$

Find the value of $m$ when $m = x$

<table>
<thead>
<tr>
<th>Solve the simultaneous equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x + y = 10$</td>
</tr>
<tr>
<td>$y = 2x^2 + 4$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is the triangle shown a right angle triangle?</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Triangle" /></td>
</tr>
<tr>
<td>$4.2 \times 10^3$</td>
</tr>
<tr>
<td>$1400/10$</td>
</tr>
<tr>
<td>$1.4 \times 10^3$</td>
</tr>
</tbody>
</table>

The lengths of the sides of a triangle are in the ratio 5:6:9

Calculate the size of the smallest angle.

The point M has coordinates $(1, \sqrt{2})$ and the point N has coordinates $(\sqrt{2}, 3)$.

Find the gradient of MN in the form $a + b\sqrt{2}$

© Corbettmaths 2016 www.corbettmaths.com
Find x

Calculate the volume of the solid shown.

The line $x - 3y = 12$ meets the y-axis at the point $A$ and the x-axis at the point $B$.

Find the distance between the midpoint of $AB$ and the origin.

A bag contains 6 red counters and 2 white counters.

James takes two counters at random, without replacement from the bag.

If these two counters are the same colour, Paul will take two counters from the bag, without replacement.

Find the probability that Paul picks two counters that are not the same colour.

Prove the difference between the squares of two consecutive numbers is equal to the sum of the two numbers.
A circle has equation \( x^2 + y^2 = 25 \)

Find the area of the circle

Sketch \( y = 3^x \)

Find angle BAC

Shown is the curve with equation \( y = x^2 + ax + b \)

Find \( a \) and \( b \)

Solve the simultaneous equations

\[
\begin{align*}
    x^2 + 3xy &= 10 \\
    x + 2y &= 3
\end{align*}
\]
### 20th October

Bag 1 contains three discs labelled two and one disc labelled one.  
Bag 2 contains two discs labelled three, one disc labelled one and one disc labelled two.

Kevin chooses a disc at random from bag 1.  
If the disc is labelled 1, he puts the disc in bag 2.  
If the disc is labelled 2, he does not put the disc in bag 2.  
Kevin then chooses a disc at random from bag 2.  
Kevin adds together the numbers from the two discs he selected to give his score.  

Find the probability of Kevin scoring 3.

<table>
<thead>
<tr>
<th>Bag 1</th>
<th>Bag 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 2 2</td>
<td>3 2 1</td>
</tr>
</tbody>
</table>

---

The volume of the cylinder and cone are equal.

Find h in terms of x.

The volume of a cylinder is given by $V = \pi r^2 h$  
The volume of a cone is given by $V = \frac{1}{3} \pi r^2 h$  

Since the volume of the cylinder and cone are equal, we have

$$\pi r^2 h = \frac{1}{3} \pi r^2 h$$

Simplifying, we get

$$h = \frac{1}{3} h$$

So, $h = \frac{3}{2} h$

---

Express $8^{4x+5}$ in the form $4^y$, stating y in terms of x.

We know that $8 = 2^3$  

So, $8^{4x+5} = (2^3)^{4x+5} = 2^{3(4x+5)} = 2^{12x+15}$

Since $4 = 2^2$, we can rewrite $2^{12x+15}$ as

$$2^{12x+15} = (2^2)^{6x+\frac{15}{2}} = 4^{6x+\frac{15}{2}}$$

So, $y = 6x + \frac{15}{2}$

---

A farmer has a triangular field which has a perimeter of 300cm.

The two smaller sides of the field are 80m and 90m long.

Calculate the area of the field.

The perimeter of the triangle is the sum of its sides.

$$P = a + b + c$$

Given $a = 80$, $b = 90$, and $P = 300$, we have

$$300 = 80 + 90 + c$$

Solving for $c$, we get

$$c = 300 - 80 - 90 = 130$$

The triangle is isosceles with sides of length 80, 90, and 130.

The area of an isosceles triangle is given by

$$A = \frac{1}{2} \times \text{base} \times \text{height}$$

The height can be found using the Pythagorean theorem.

Let $h$ be the height of the triangle.

By the Pythagorean theorem,

$$h^2 = 80^2 - (90 - 130)^2$$

Solving for $h$, we get

$$h = \sqrt{80^2 - (40)^2} = \sqrt{6400 - 1600} = \sqrt{4800} = 40\sqrt{3}$$

So, the area of the field is

$$A = \frac{1}{2} \times 130 \times 40\sqrt{3} = 2600\sqrt{3} \text{ square meters}$$
### 21st October

#### Find x

![Triangle](image1)

- 5/10
- 10/10
- x

#### Sketch

- **y = 2 + \sin x**

![Graph](image2)

- **y = 3 - \cos x**

![Graph](image3)

#### Prove algebraically that the sum of the squares of two odd integers is always even.

#### Calculate the volume of the pyramid.

![Pyramid](image4)

- A
- B
- C
- D
- E
- 8 cm
- 5 cm
- 10 cm

© Corbettmaths 2016

www.corbettmaths.com
### 22nd October

**Sketch**

\[ y = \frac{1}{x} \]

![Graph of \( y = \frac{1}{x} \)](image)

**Sketch**

\[ y = 4^x \]

![Graph of \( y = 4^x \)](image)

---

**Factorise fully**

\[ y - 4y^3 \]

---

**Solve, giving your answers to one decimal place.**

\[ \frac{6}{x - 1} = \frac{5 - 2x}{x - 3} \]

---

**The curve \( y = x^2 - 6x + 1 \) has a line of symmetry.**

Write down the equation of the line of symmetry
What are the coordinates of the new position of P when the graph $y = f(x)$ is transformed to the graph of $y = f(x+3)$?

Prove $(n + 10)^2 - (n + 5)^2$ is always a multiple of 5

The graph of $y = c + dx$ passes through the points $(1, 7)$ and $(3, 127)$.

$a > 0$ and $b > 0$

Find the values of $a$ and $b$

A frustum is made by cutting a small cone from the top of a larger cone, that was 21cm tall.

Calculate the surface area of the frustum

A group of students want to estimate how many woodlice live in a greenhouse.

They catch and mark 20 woodlice.

They return the 20 woodlice to the greenhouse.

They then catch 50 woodlice and 11 are marked

Estimate the number of woodlice in the greenhouse.
24th October

Harry has rounded a number to 10 to one significant figure.
Write down the upper bound and lower bound.

How many students did Hannah survey?

Hannah surveyed students on how far they travel to college

Calculate an estimate of the mean distance travelled

Rebecca has 9 cards, each with a number on it. She picks three cards at random, without replacement. Rebecca adds the three numbers to get a score.

Calculate the probability that the score is an even number

Express $3x^2 + 18x - 1$ in the form $a(x + b)^2 + c$
<table>
<thead>
<tr>
<th>Date</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>25th October</td>
<td>(c : d : e = 9 : 7 : 2) Work out (2c + e : 2d) in its simplest form.</td>
</tr>
<tr>
<td></td>
<td>Calculate the surface area of the pyramid</td>
</tr>
<tr>
<td></td>
<td>Calculate the volume of the pyramid</td>
</tr>
<tr>
<td></td>
<td>Shown is the net of a square based pyramid.</td>
</tr>
<tr>
<td></td>
<td>The area of the base is (64\text{cm}^2)</td>
</tr>
<tr>
<td></td>
<td>For the function (f(x) = x^2 + 2x + 1), show that (f(x + 2) - f(x) = 4x + 8).</td>
</tr>
<tr>
<td></td>
<td>One solution of a quadratic equation in the form (y = ax^2 + bx + c) is (x = \frac{3 + \sqrt{65}}{4}).</td>
</tr>
<tr>
<td></td>
<td>Find possible values of (a, b) and (c).</td>
</tr>
<tr>
<td>26th October</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>The line L has equation $y = 2x + 8$</td>
<td></td>
</tr>
<tr>
<td>The line L crosses the x–axis at the point A.</td>
<td></td>
</tr>
<tr>
<td>The line M is perpendicular to Line L and passes through the point A</td>
<td></td>
</tr>
<tr>
<td>Find the coordinates of the point A.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Find equation of the Line M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$O_1C = 8a$</td>
</tr>
<tr>
<td>$OA = 4b$</td>
</tr>
<tr>
<td>$AB = 2b$</td>
</tr>
<tr>
<td>$OL = 6a$</td>
</tr>
<tr>
<td>M is the midpoint of AC</td>
</tr>
<tr>
<td>Work out the vector $\overrightarrow{LM}$</td>
</tr>
<tr>
<td>Show that L, M and B lie on a straight line.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Express as a single fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{b}{a} - \frac{a - 1}{b + 1}$</td>
</tr>
</tbody>
</table>
Evaluate

\[ 64 - \frac{2}{3} \]

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

Simplify

\[ \sqrt{75} + \sqrt{48} \]

The curve \( y = x^2 - 3x - 4 \) is reflected in the y-axis.

Find the equation of the new curve.

Solve the simultaneous equations

\[
\begin{align*}
2x + y - 7 &= 0 \\
xy &= 6
\end{align*}
\]
### 28th October

A sequence is defined by the term-to-term rule

\[ u_{n+1} = 5u_n + 2 \]

\[ u_2 = 22 \]  

<table>
<thead>
<tr>
<th>Find ( u_1 )</th>
</tr>
</thead>
</table>

Make \( x \) the subject of

\[ y = \frac{c}{(x + b)^3} \]

### The numbers a, b and c are irrational numbers and not equal.

\( abc \) is rational.

Write down possible values of a, b and c

<table>
<thead>
<tr>
<th>Find the vector ( \overrightarrow{OB} ) in terms of a and b</th>
</tr>
</thead>
</table>

Find the vector \( \overrightarrow{OB} \) in terms of a and b

Q is the midpoint of OB.
B is the midpoint of AC.
Show PQC is a straight line.

AOB is a triangle.
P is a point on AO.

\[ \overrightarrow{AB} = 2a \quad \overrightarrow{AO} = 6b \quad \overrightarrow{AP:PO} = 2:1 \]
A sculptor wants to transport a piece of rock. It is a sphere with radius 0.4m to the nearest centimetre. The density of the rock is 3.4g/cm³. The truck can carry up to 1000kg to one significant figure.

Can the sculptor safely transport the rock?

A remote control car drives in a straight line. It starts from rest and travels with constant acceleration for 15 seconds reaching a velocity of 10m/s. It then travels at a constant speed for 5 seconds. It then slows down with constant deceleration of 0.5m/s².

Draw a velocity-time graph and work out the total distance travelled.

Find the exact length of the side labelled w.
## 30th October

Which region is shown in yellow?

<table>
<thead>
<tr>
<th>A ∩ B</th>
<th>A' ∩ B</th>
<th>A ∪ B</th>
<th>A ∪ B'</th>
</tr>
</thead>
</table>

![Venn Diagram](image)

---

**Work out an estimate of how many employees have a salary of between £2300 and £2900**

The histogram below shows the monthly salaries of employees. There are 216 people who have a monthly salary of between £1800 and £2100.

![Histogram](image)

---

**Calculate angle CAE.**

---

Carl says the solutions to \( x^2 - 7x + 12 > 0 \) is \( 3 < x < 4 \)

Is he correct?

Explain your answer.
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculate the area of the segment</td>
<td></td>
</tr>
<tr>
<td>Work out the $n$th term for the sequence $1, 5, 15, 31, 53 \ldots$</td>
<td></td>
</tr>
<tr>
<td>Find the 10th term in the sequence</td>
<td></td>
</tr>
<tr>
<td>Find the coordinates of points A and B</td>
<td></td>
</tr>
<tr>
<td>The circle $x^2 + y^2 = 100$ and the line $8x + y - 10 = 0$ meet at the points A and B</td>
<td></td>
</tr>
<tr>
<td>Find the length of $AB$.</td>
<td></td>
</tr>
<tr>
<td>Shown is $y = \cos(x)$</td>
<td></td>
</tr>
<tr>
<td>On the same grid, sketch $y = \cos(x) + 2$</td>
<td></td>
</tr>
</tbody>
</table>