Write your name here

| Surname | Other Names |
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# Mathematics

## November 2018 Paper 2 (Calculator Allowed)
## Part 2 (Second half of the paper)
## Edexcel Higher Tier

Time: 45 minutes

| Q | Topic | Max Mark | My Marks |
|---|---|---|---|
| 12 | Simplifying and Adding Algebraic Fractions | 6 | |
| 13 | Circumference of a Circle, Area of a Triangle | 3 | |
| 14 | Exponential Graphs | 2 | |
| 15 | The Equation of a Circle | 1 | |
| 16 | Probability Trees | 4 | |
| 17 | Ratio Problems, Ratio to an Equation | 5 | |
| 18 | The Equation of a Line, Simultaneous Equations | 4 | |
| 19 | Solving (Quadratic) Inequalities | 5 | |
| 20 | Spheres , Cones, Similar Shapes, Density | 5 | |
| 21 | Circle Theorems (Proof) | 4 | |
| | Total | 39 | |

**12** (a) Write $\frac{4x^2 - 9}{6x + 9} \times \frac{2x}{x^2 - 3x}$ in the form $\frac{ax + b}{cx + d}$ where $a$, $b$, $c$ and $d$ are integers.

.....

(3)

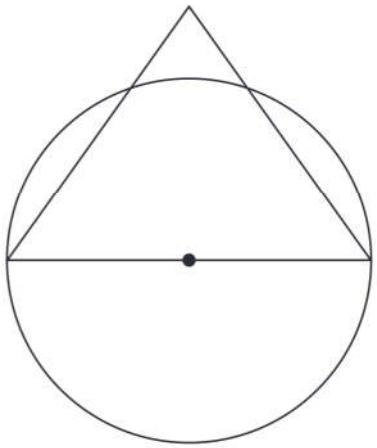
(b) Express $\frac{3}{x+1} + \frac{1}{x-2} - \frac{4}{x}$ as a single fraction in its simplest form.

.....

(3)

**(Total for Question 12 is 6 marks)**

**13** The diagram shows a circle and an equilateral triangle.



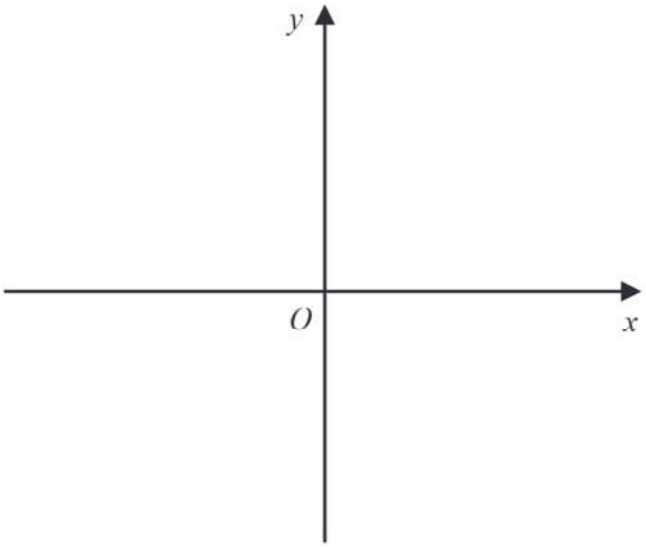
One side of the equilateral triangle is a diameter of the circle.
The circle has a circumference of 44 cm.

Work out the area of the triangle.
Give your answer correct to 3 significant figures.

..... $cm^2$

**(Total for Question 13 is 3 marks)**

**14** On the grid, sketch the curve with equation $y = 2^x$
Give the coordinates of any points of intersection with the axes.




**(Total for Question 14 is 2 marks)**

**15** The equation of a circle is $x^2 + y^2 = 42.25$

Find the radius of the circle.

.....

**(Total for Question 15 is 1 mark)**

**16** There are only red counters and blue counters in a bag.

Joe takes at random a counter from the bag.
The probability that the counter is red is 0.65
Joe puts the counter back into the bag.

Mary takes at random a counter from the bag.
She puts the counter back into the bag.

(a) What is the probability that Joe and Mary take counters of different colours?

.....

(2)

There are 78 red counters in the bag.

(b) How many blue counters are there in the bag?

.....

(2)

**(Total for Question 16 is 4 marks)**

**17** $p$ and $q$ are two numbers such that $p > q$

When you subtract 5 from $p$ and subtract 5 from $q$ the answers are in the ratio 5 : 1
When you add 20 to $p$ and add 20 to $q$ the answers are in the ratio 5 : 2

Find the ratio $p : q$
Give your answer in its simplest form.

.....

**(Total for Question 17 is 5 marks)**

**18** The straight line $\mathbf{L}_1$ passes through the points with coordinates (4, 6) and (12, 2)
The straight line $\mathbf{L}_2$ passes through the origin and has gradient $-3$

The lines $\mathbf{L}_1$ and $\mathbf{L}_2$ intersect at point $P$.

Find the coordinates of $P$.

(..... , .....)

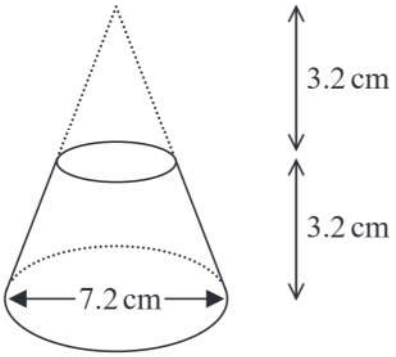
**(Total for Question 18 is 4 marks)**

**19** Solve $22 < \frac{m^2 + 7}{4} < 32$

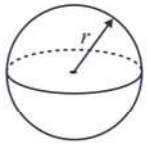
Show all your working.

**(Total for Question 19 is 5 marks)**

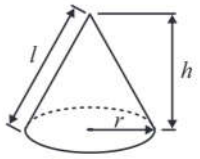
**20** Here is a frustum of a cone.




Volume of sphere = $\frac{4}{3}\pi r^3$



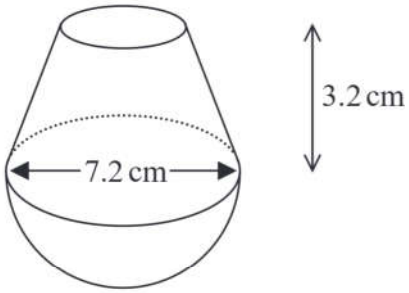

Volume of cone = $\frac{1}{3}\pi r^2 h$




The diagram shows that the frustum is made by removing a cone with height 3.2 cm from a solid cone with height 6.4 cm and base diameter 7.2 cm.

The frustum is joined to a solid hemisphere of diameter 7.2 cm to form the solid **S** shown below.

Solid **S**



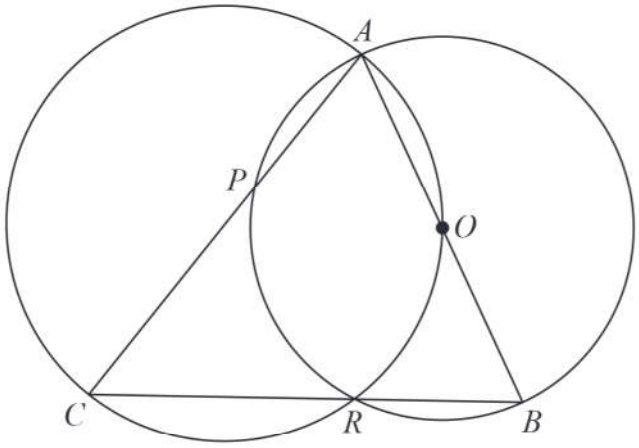

The density of the frustum is 2.4 g/cm$^3$
The density of the hemisphere is 4.8 g/cm$^3$

Calculate the average density of solid **S**.

.....g/cm$^3$

**(Total for Question 20 is 5 marks)**

**21**




$A$, $B$, $R$ and $P$ are four points on a circle with centre $O$.
$A$, $O$, $R$ and $C$ are four points on a different circle.
The two circles intersect at the points $A$ and $R$.

$CPA$, $CRB$ and $AOB$ are straight lines.

Prove that angle $CAB$ = angle $ABC$.

**(Total for Question 21 is 4 marks)**

**TOTAL FOR PAPER IS 80 MARKS**