



National College *of* Ireland

PAPER 2

Sample Questions

ABSTRACT

Revision Notes

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Ordinary Maths

Area / Volume

A SPHERE

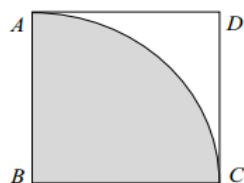
A company has a spherical storage tank. The diameter of the tank is 12 m (2015 Q8)

- (i) Write down the radius of the tank
- (ii) Find the volume of the tank, correct to the nearest m^3
- (iii) Find the curved surface area of the tank, correct to one decimal place
- (iv) The curved surface is painted with a special paint. One litre of paint will cover 3.5 m^2 . Find how many litres of paint are used, correct to the nearest litre.

SECTOR OF A CIRCLE & SQUARE

The square ABCD has an area of 81 cm^2 . Find $|AD|$

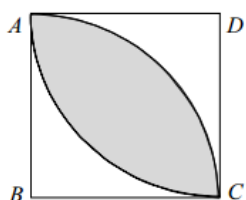
A sector of a circle, centre B and radius $|BC|$, is drawn inside ABCD as shown by the shaded region.



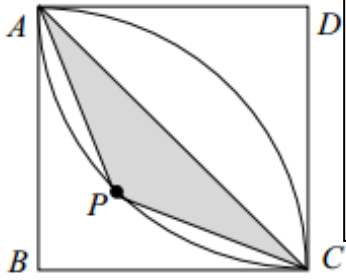
- (i) Find the area of the sector, correct to one decimal place.
- a circle, centre D and radius $|DA|$, is drawn.

Find the area of the shaded region (the overlap of the two sectors),

Correct to one decimal place

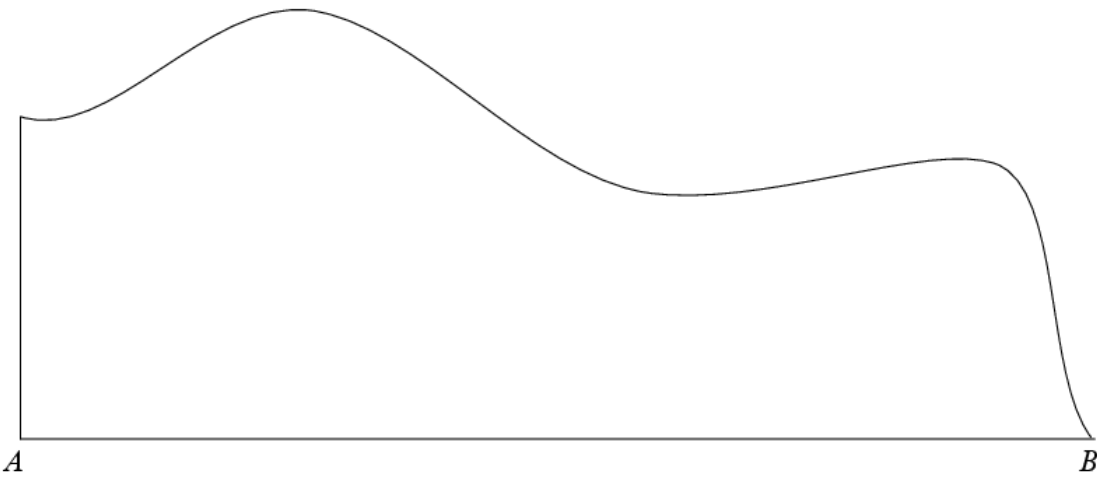


Area / Volume



The point P is on the arc of the sector DAC, as shown. The triangle APC is isosceles. Find the area of the triangle APC, correct to one decimal place.

TRAPEZOIDAL



Divide the shape into five equal intervals and use the trapezoidal rule to estimate the area of the shape. (2014 Sample Q5)

CYLINDER

A solid cylinder has a radius of 10 mm and a height of 45 mm.

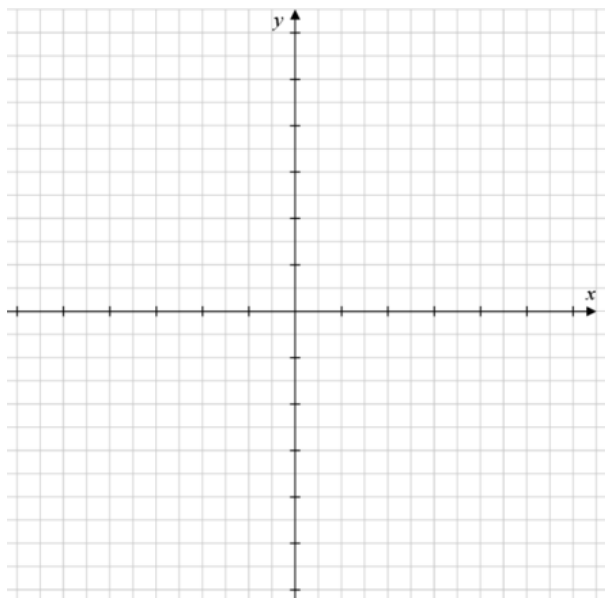
(i) Calculate the volume of the cylinder. Give your answer in terms of π .

(ii) A sphere has the same volume as the cylinder. Find the surface area of the sphere. Give your answer in terms of π

The Circle

CIRCLE WITH CENTRE (0,0)

Draw the circle $c: x^2 + y^2 = 25$. Show your scale on both axes.



Verify, using algebra, that $A(-4, 3)$ is on c

CIRCLE WHOSE CENTRE IS NOT (0,0)

Find the equation of the circle with centre $(-4, 3)$ that passes through the point $(3, 4)$.

The circle c has equation $(x + 2)^2 + (y - 3)^2 = 100$. Write down the co-ordinates of A , the centre of c .

TANGENT TO THE CIRCLE

The point $P(-8, 11)$ is on the circle $c: (x + 2)^2 + (y - 3)^2 = 100$. Find the equation of t , the tangent to the circle c at the point P .

Probability

Q1 POSSIBLE OUTCOMES

A bank issues a unique six-digit password to each of its online customers. The password may contain any of the numbers 0 to 9 in any position and numbers may be repeated. For example, the following is a valid password. (2015 Q1)

- (i) How many different passwords are possible?
- (ii) How many different passwords do not contain any zero?
- (iii) One password is selected at random from all the possible passwords. What is the probability that this password contains at least one zero?

(b) John is issued with one such password from the bank. Each time John wants to access his account online, the bank's website requires him to input three of his password digits into the boxes provided. For example, he may be asked for the 2nd, 4th and 5th digits, as shown below

In how many different ways can the bank select the three required boxes?

Probability

Try these Similar Q's

(A) The personal identification number (PIN) for a mobile phone consists of a four-digit number which is formed from the digits 0 – 9 inclusive. (DEB Mock 2015)

(i) How many PIN numbers are possible? (ii) How many PIN numbers are possible if the number cannot begin with a '0' and each digit can only be used once?

(B) The theft of mobile phones; latest figures of reported crimes showing 12000 phones stolen in 2012. Research determined that phones were stolen from 1 in 20 young people when out in Dublin during this year. (DEB Mock 2015)

(i) Lucy & Helen are out socialising for the night in Dublin. What is the probability that one of the girls has her phone stolen?

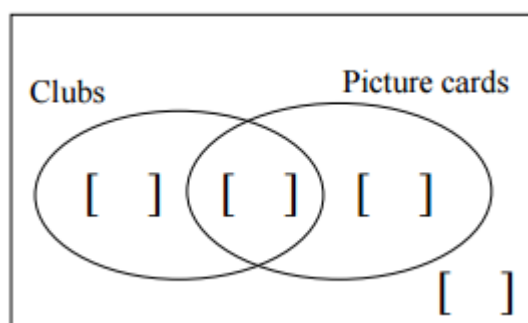
(ii) There are 800 students in Lucys school. How many would you expect to have their phone stolen?

(iii) Give a reason why you think the research might be biased?

Q2. VENN DIAGRAMS

In the Venn diagram below, the universal set is a normal deck of 52 playing cards. The two sets shown represent clubs and picture cards (kings, queens and jacks). (2012 Q2)

Show on the diagram the number of elements in each region.



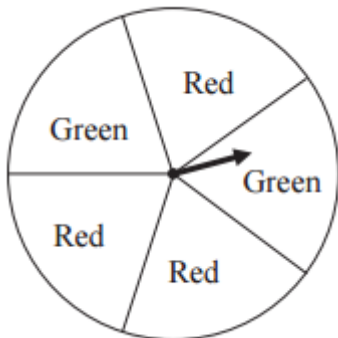
(i) A card is drawn from a pack of 52 cards. Find the probability that the card drawn is the king of clubs.

(ii) A card is drawn from a pack of 52 cards. Find the probability that the card drawn is a club or a picture card.

Probability

- (iii) Two cards are drawn from a pack of 52 cards. Find the probability that neither of them is a club or a picture card. Give your answer correct to two decimal places.

three coloured red. (2012 Q2)



A game consists of spinning the spinner 3 times. Each time the spinner stops on green the player wins €1, otherwise the player wins nothing. For example, if the outcome of one game is “green, red, green” the player wins €2.

- (i) Is one spin of the spinner above an example of a Bernoulli trial?
(ii) Explain what a Bernoulli trial is.

Statistics

TYPES OF DATA

The heights of a random sample of 1000 students were collected and recorded

How would you categorise the type of data collected. Explain your choice. (2015 Q9)

Categorical Nominal	_____
Categorical Ordinal	_____
Numerical Discrete	_____
Numerical Continuous	_____

MEAN, RANGE, MEDIAN

Table 1 (Girls)								
Height (cm)	145-150	150-155	155-160	160-165	165-170	170-175	175-180	180-185
Number of girls	15	48	80	112	125	81	29	10

- Use the information in Table 1 to estimate the mean height of the girls, using mid-interval values.
- What is the largest possible value for the range of the heights of the girls in this sample?
- The median height of the girls in the sample is 164.5 cm. Explain what this means in the context of the heights of the 500 girls.

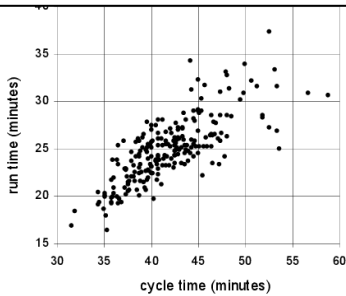
NULL HYPOTHESIS, MARGIN OF ERROR & CONFIDENCE INTERVAL

“Less than 30% of primary school students walk to school on a regular basis”

A group of students carried out a survey of the primary schools in their local area. They found that 270 out of a total of 860 surveyed walked to school regularly. Use a hypothesis test at the 5% level of

Statistics

significance to decide whether there is sufficient evidence to reject the newspapers claim. State clearly the null hypothesis in your conclusion.



The scatter diagram shows the relationship between athlete's performances in a duathlon.

The correlation coefficient for these two events is which one of these numbers: 0.95, 0.77, 0.13, -0.13, -0.77, -0.95

STANDARD DEVIATION (2012 Sample)

The table represents data for four different sets A, B, C, D

	A	B	C	D
size (N)	1000	100	100	10
mean (μ)	10	100	1000	100
standard deviation (σ)	20	30	20	10

- (i) On average the data in set ____ are the biggest numbers and the data in set _____ are the smallest numbers.
- (ii) The data in set ____ are more spread out
- (iii) The set that must contain negative numbers is _____
- (iv) If the four sets were combined the median is most likely to be a value in set _____

The Line

SLOPE & EQUATION OF A LINE

l is the line $3x + 2y + 18 = 0$. Find the slope of l (2013 Q3)

Given the points A (3,5) B (-6, 2) and C (4, -4). Find the equation of the line AB (2014 Sample Q3)

AREA OF A TRIANGLE

Find the area of the triangle ABC [use the points given above] (2014 Sample Q3)

LINES PERPENDICULAR

The line k is perpendicular to the line $3x + 2y + 18 = 0$ and cuts the x-axis at (7,0).

Find the equation of k (2013 Q3)

POINT OF INTERSECTION OF TWO LINES

Find co-ordinates of the point of intersection from the lines l and k [above] (2013 Q3)

The Line

INTERSECTION OF A LINE WITH THE X OR Y AXIS

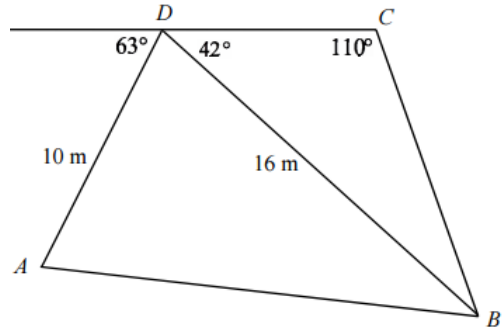
The line BC has the equation $4x - 3y - 9 = 0$. It intersects the y-axis at the point B. Find the coordinates of B. *(DEB Mock 2015 Q4)*

Trigonometry

SINE RULE / COSINE RULE / AREA OF A TRIANGLE

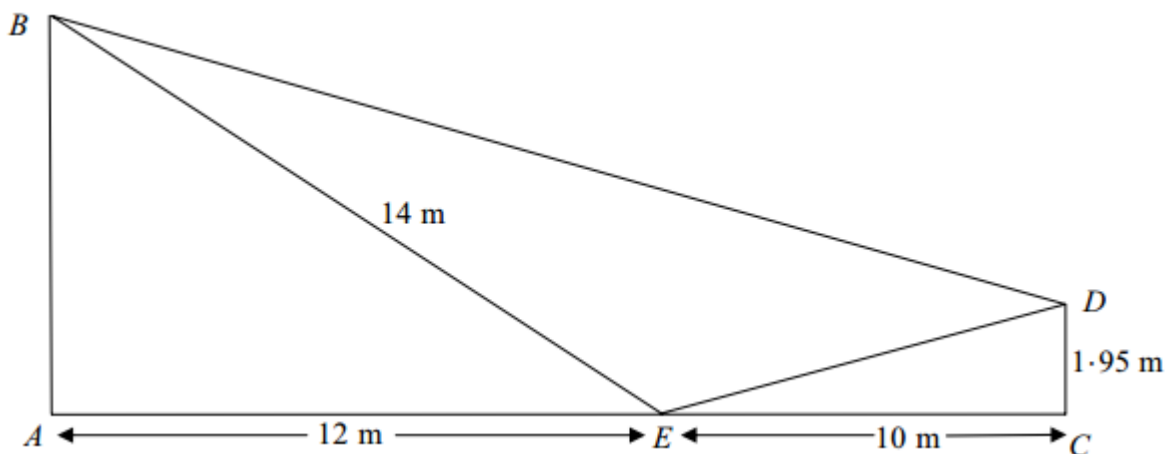
The diagram shows the triangles BCD and ABD, with some measurements given. (2015 Q5)

- Find $|BC|$, correct to two decimal places
- Find the area of the triangle BCD, correct to two decimal places.
- Find $|AB|$, correct to two decimal places.



PYTHAGORAS / SOHCAHTOA

At an activity centre a zip-line, [BD], runs between two vertical poles, [AB] and [CD], on level ground, as shown. The point E is on the ground, directly below the zip-line. $|AE| = 12\text{m}$ $|BE| = 14\text{m}$
 $|CD| = 1.95\text{m}$ $|EC| = 10\text{m}$



Find the distance $|ED|$, correct to one decimal place.

Find $\angle AEB$, correct to the nearest degree.

Find $\angle DEB$, given that $\angle CED = 11^\circ$, correct to the nearest degree.
Hence, or otherwise, find the distance $|DB|$. Give your answer correct to one decimal place.

