

LIVE: FINAL EXAM PREPARATION PAPER 2
02 NOVEMBER 2014

Lesson Description

In this lesson we:

- Work through questions from various Paper 2 papers.


Exam Questions
Trigonometry
Question 1

 1.1 If $\cos\beta = \frac{p}{\sqrt{5}}$ where $p < 0$ and $\beta \in [180^\circ; 360^\circ]$, determine using a diagram, an expression in terms of p for:

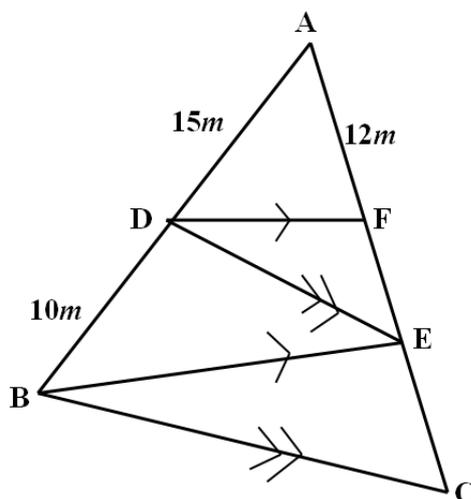
1.1.1 $\tan\beta$ (4)

1.1.2 $\cos 2\beta$ (3)

 1.2 Solve for x if $\sin x + 2\cos^2 x = 1$ (7)

Euclidean Geometry: Proportion
Question 2

(Adapted from GDE, 2014, Paper 2, Question 11)

 In the accompanying diagram, $AD = 15\text{ m}$, $DB = 10\text{ m}$ and $AF = 12\text{ m}$.

 If $DE \parallel BC$ and $DF \parallel BE$, calculate the length of AC . (8)

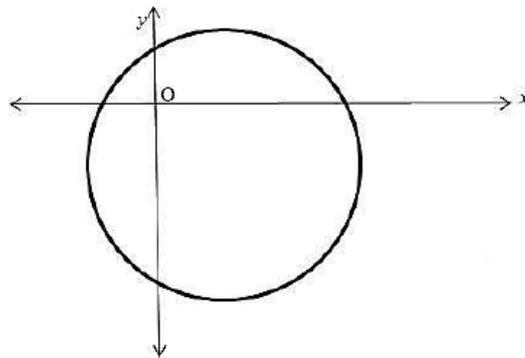


Analytical Geometry

Question 3

(Adapted from EC, 2014, Paper 2, Question 4)

The length of the radius of the circle with equation $x^2 - 2x + y^2 + 4y = a$ is 5 units.



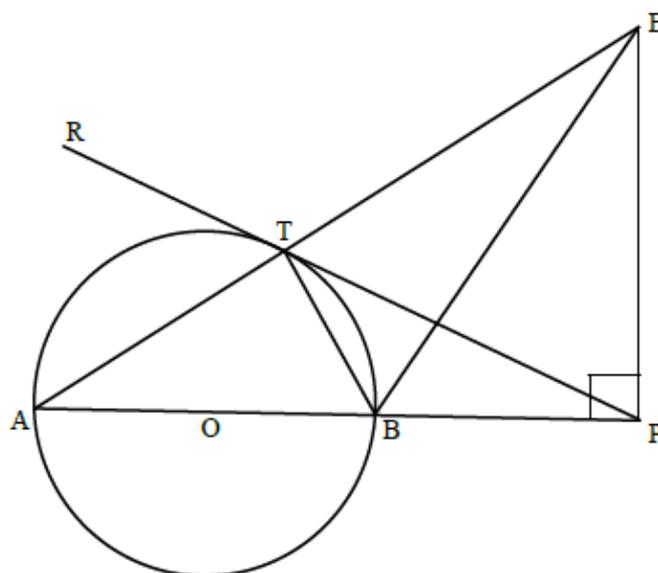
- 3.1 Show by means of calculations that $a = 20$ units. (4)
- 3.2 Write down the coordinates of the centre M of the circle. (1)
- 3.3 $A(x ; y)$, with $y > 0$, is one of the points of intersection of the circle and the straight line $x = 4$. Determine the values of x and y . (4)
- 3.4 Determine the equations of the tangent to the circle at the point A. (4)
- 3.5 Determine whether the point $T(-1 ; -2)$ lies inside or outside the circle. (3)
- 3.6 If the circle is translated 3 units to the left and 1 unit up, determine the equation of the new circle. (3)

Euclidean Geometry

Question 4

(Adapted from EC, 2014, Paper 2, Question 10)

In the diagram below, O is the centre with A, B and T on the circumference, $BP = OB = AO$, PTR is a tangent and $EP \perp AP$.





Prove that:

- 4.1 TEPB is a cyclic quad. (3)
- 4.2 $\triangle ATB \parallel \triangle APE$ (3)
- 4.3 $TP = PE$ (6)
- 4.4 $\triangle ATB \parallel \triangle EPB$ (5)
- 4.5 $2PB^2 = BE \cdot TB$ (4)

Trigonometry

Question 5

- 5.1 Prove the identity: $\frac{\tan x}{\cos x} + \tan^2 x = \frac{\sin x}{1 - \sin x}$ (6)
- 5.2 For which values of x is the identity undefined? (4)
- 5.3 Determine the general solution to $1 - \cos 2\theta = 8 \sin \theta \cdot \sin 2\theta$, where $\sin \theta \neq 0$.
Give your answer correct to one decimal digit. (6)
- 5.4 Simplify:
$$\sqrt{\frac{\tan(-207^\circ)}{\tan 333^\circ} - \frac{\sin^2(360^\circ - x)}{\cos x \cdot \sin(x - 90^\circ)}}$$
 (7)

Trigonometry

Question 6

- Given: $f(x) = \cos \frac{1}{2}x$ and $g(x) = \sin(x + 60^\circ)$
- 6.1 Solve for x , if $\sin(x + 60^\circ) = \cos \frac{1}{2}x$ and $x \in [-60^\circ; 300^\circ]$ (6)
 - 6.2 Draw sketch graphs of the curves of f and g for $x \in [-60^\circ; 300^\circ]$. Show clearly the co-ordinates of all turning points and endpoints and the intercepts with the axes.
 - 6.3 Use the solution obtained in Question 6.1 as well as the graph drawn in Question 6.2 to determine the value(s) of $x \in [-60^\circ; 300^\circ]$, for which:
 - 6.3.1 $f(x) < g(x)$ (3)
 - 6.3.2 $f(x) \cdot g(x) \leq 0$ (2)



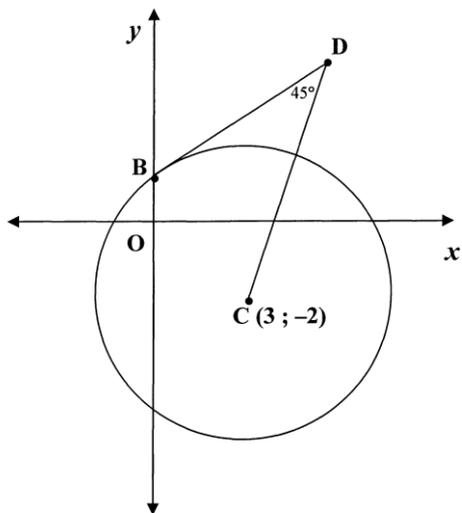
Question 7

In the diagram below, BD is a tangent to the circle at point B , which lies on the y -axis.

The centre of the circle is $C(3; -2)$.

The equation of tangent BD is given by $3x - 4y + 8 = 0$

$\widehat{BDC} = 45^\circ$



- 7.1 Calculate the co-ordinates of B . (2)
- 7.2 Determine the equation of the circle. (3)
- 7.3 Determine the value(s) of q , if $x + q = 0$ is the equation of a tangent to the circle. (3)
- 7.4 Write down the length of BD . (3)