Year 1 – Week 14 Exam Questions

A selection from OCR Papers (2018)

Question	1	2	3	4	5	6	7	8	Total	
Marks										
Max Marks	5	4	5	6	4	6	7	8	45	%

Estimated time: 55 minutes

Question 1

In this question you must show detailed reasoning.

(i) Express $3^{\frac{7}{2}}$ in the form $a\sqrt{b}$, where a is an integer and b is a prime number. **[2]**

(ii) Express $\dfrac{\sqrt{2}}{1-\sqrt{2}}$ in the form $c + d\sqrt{e}$, where c and d are integers and e is a prime number. **[3]**

Question 2

(i) The equation $x^2 + 3x + k = 0$ has repeated roots. Find the value of the constant k. **[2]**

(ii) Solve the inequality $6 + x - x^2 > 0$. **[2]**

Question 3

The probability distribution of a random variable X is given in the table.

x	0	2	4	6
$P(X = x)$	$\frac{3}{8}$	$\frac{5}{16}$	$4p$	p

(i) Find the value of p. **[2]**

(ii) Two values of X are chosen at random. Find the probability that the product of these values is 0. **[3]**

Question 4

In triangle ABC, $AB = 20\,\text{cm}$ and angle $B = 45°$.

(i) Given that $AC = 16\,\text{cm}$, find the two possible values for angle C, correct to 1 decimal place. **[4]**

(ii) Given instead that the area of the triangle is $75\sqrt{2}\,\text{cm}^2$, find BC. **[2]**

Question 5

(i) The curve $y = \frac{2}{3+x}$ is translated by four units in the positive x-direction. State the equation of the curve after it has been translated. **[2]**

(ii) Describe fully the single transformation that transforms the curve $y = \frac{2}{3+x}$ to $y = \frac{5}{3+x}$. **[2]**

Question 6

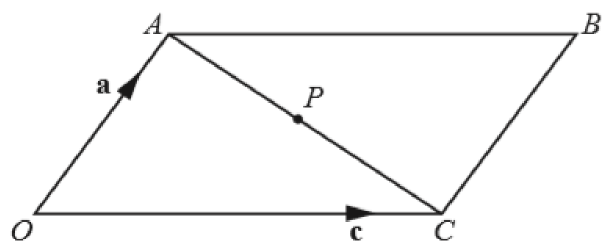
(i) Express $4x^2 - 12x + 11$ in the form $a(x+b)^2 + c$. **[3]**

(ii) State the number of real roots of the equation $4x^2 - 12x + 11 = 0$. **[1]**

(iii) Explain fully how the value of r is related to the number of real roots of the equation $p(x+q)^2 + r = 0$ where p, q and r are real constants and $p > 0$. **[2]**

Question 7

$OABC$ is a parallelogram with $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$. P is the midpoint of AC.



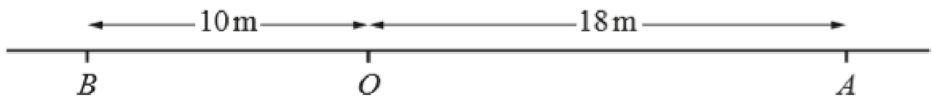
(i) Find the following in terms of **a** and **c**, simplifying your answers.

(a) $\overrightarrow{AC}$ **[1]**

(b) $\overrightarrow{OP}$ **[2]**

(ii) Hence prove that the diagonals of a parallelogram bisect one another. **[4]**

Question 8



A particle P is moving along a straight line with constant acceleration. Initially the particle is at O. After 9 s, P is at a point A, where $OA = 18$ m (see diagram) and the velocity of P at A is $8\,\mathrm{m\,s^{-1}}$ in the direction $\overrightarrow{OA}$.

(i) **(a)** Show that the initial speed of P is $4\,\mathrm{m\,s^{-1}}$. **[2]**

(b) Find the acceleration of P. **[2]**

B is a point on the line such that $OB = 10$ m, as shown in the diagram.

(ii) Show that P is never at point B. **[4]**