

Pure Year 11 into 12 Transition work

Question 1

Skill involved: 339b: Solve a linear inequality in one variable with two steps.

Solve $7x - 3 < 11$

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(4 marks)

Question 2

Skill involved: 393e: Rationalise the denominator of a fraction given in the form $\frac{a + \sqrt{b}}{c + \sqrt{b}}$

Show that $\frac{5 - \sqrt{2}}{\sqrt{2} - 1}$ can be written in the form $a + b\sqrt{2}$ where a and b are integers.

$a = \dots\dots\dots, b = \dots\dots\dots$
(3 marks)

Question 3

Skill involved: 341a: Solve a two-ended linear inequality in one variable with a single step.

Find all the possible integer values that satisfy the inequality $-4 \leq x - 3 < 1$

.....
(3 marks)

Question 4

Skill involved: 391e: Change the subject of a formula where the subject appears twice with a square root.

Make c the subject of the formula $f = \sqrt{\frac{a+bc}{c-d}}$

$c = \dots\dots\dots$
(4 marks)

Question 5

Skill involved: 276e: Solve linear simultaneous equations/systems of equations where both equations need to be scaled.

Solve, algebraically, the system of equations

$$\begin{aligned} 2p - 7r &= 11 \\ 3p + 2r &= 4 \end{aligned}$$

$$p = \dots\dots\dots, r = \dots\dots\dots$$

(3 marks)**Question 6**

Skill involved: 387e: Simplify algebraic fractions where factorisation of a simple quadratic on both the numerator and denominator is required.

Simplify $\frac{y^2-6y}{y^2-3y-18}$

.....

(2 marks)**Question 7**

Skill involved: 389d: Add or subtract algebraic fractions with algebraic denominators made up of single terms.

Show that, for $x \neq 0$

$$\frac{x+4}{3x} - \frac{5}{2x}$$

can be written in the form $\frac{ax+b}{cx}$ where a, b and c are integers.

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

$$c = \dots\dots\dots$$

(3 marks)**Question 8**

Skill involved: 390c: Add or subtract algebraic fractions where quadratic factorising is required (changing one denominator).

$$f(x) = \frac{2x+2}{x^2-2x-3} - \frac{x+1}{x-3}$$

Express $f(x)$ as a single fraction in its simplest form.

$$f(x) = \dots\dots\dots$$

(4 marks)

Question 9

Skill involved: 394r: Simplify an algebraic fraction using index laws with negative and fractional powers and surd notation.

Write $\frac{9x^7 \times 2\sqrt{x}}{3x^4}$ in the form kx^m

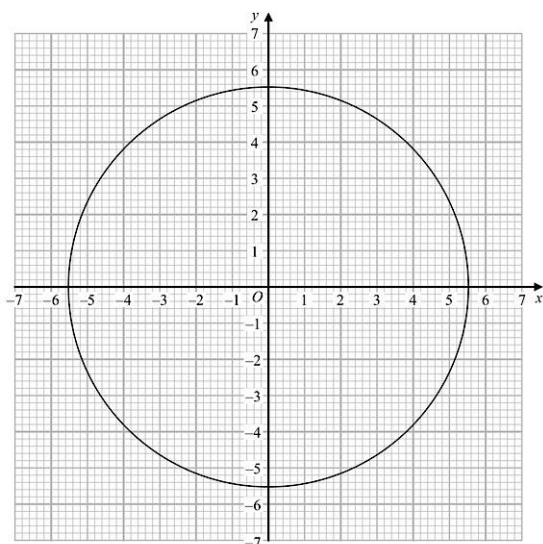
.....

(4 marks)

Question 10

Skill involved: 275b: Solve linear simultaneous equations/systems of equations by first plotting each line.

The diagram shows the graph of $x^2 + y^2 = 30.25$



Use the graph to find estimates for the solutions of the simultaneous equations

$$x^2 + y^2 = 30.25$$

$$y - 2x = 1$$

Input note: Enter the smallest x and y values first.

$x =$

$y =$

$x =$

$y =$

(3 marks)

Question 11

Skill involved: 436f: Determine the inverse function where $f(x) = \frac{ax+b}{cx+d}$

The function f is such that

$$f(x) = \frac{2}{3x-5} \quad \text{where } x \neq \frac{5}{3}$$

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

$$f^{-1}(x) = \dots\dots\dots$$

(2 marks)

Question 12

Skill involved: 435a: Calculate the numeric output of a composite function.

f and g are functions such that

$$f(x) = \frac{12}{\sqrt{x}} \quad \text{and} \quad g(x) = 3(2x + 1)$$

Find $gf(9)$

$$gf(9) = \dots\dots\dots$$

(2 marks)

Question 13

Skill involved: 448c: Understand the effect on a point under the transformation $y = f(x + a)$

A curve has equation $y = f(x)$

The coordinates of the minimum point on this curve are $(-9, 15)$

Write down the coordinates of the minimum point on the curve with equation
 $y = f(x + 3)$

(..... ,)

(1 mark)

Question 14

Skill involved: 495a: Determine an equation of a straight line given the gradient and one point using $y - y_1 = m(x - x_1)$

The line l_1 has the equation $x - 3y - 21 = 0$.

The line l_2 passes through the origin O and has gradient -2 . The lines l_1 and l_2 intersect at the point P .

Calculate the coordinates of P .

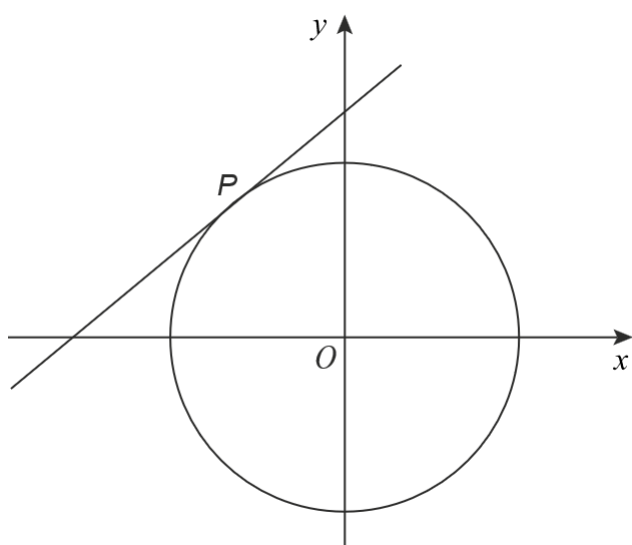
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(4 marks)

Question 15

Skill involved: 447a: Determine the equation of a tangent to a circle centred at the origin.

$P(-1, 4)$ is a point on a circle, centre O



Work out the equation of the tangent to the circle at P .

Give your answer in the form $y = mx + c$

.....

(4 marks)