Revision

① The nth term of a sequence is $2n+1$.
The nth term of a different sequence is $3n-1$.
Work out the numbers between 20 and 40 that appear in both sequences. [3]

② What type of sequence is each of the following?

(i)   1, 2, 3, 4   (ii) 1, 2, 4, 7

(iii) 1, 2, 4, 8   (iv) 8, 6, 4, 2   [2]

③ (a) What is the nth term of the following sequences?   [1]

(i)   6, 10, 14, 18   [2]

(ii) 2, 14, 36, 68

(iii) 2, $2\sqrt{7}$, 14, $14\sqrt{7}$ [4]

(b) Is 110 in any of the above sequences?   [3]

④ (a) Write the first 8 terms of the sequence n^2-n+11. [2]

(b) Show that this does not only produce prime numbers. [2]

⑤ What is the 10th term of the sequence $2^n + 2^{n-1}$? [1]

⑥ What is the first negative term of the sequence with n^{th} term $= 98 - 3n$? [3]

(7) Simplify the following expressions,

(a) $x^5 \div x^3$ [1]

(b) $\dfrac{x^{10}}{x^7} x^3$ [2]

(c) $(4x^2 \times 2x^2)^2$ [2]

(d) 437.5^0 [1]

(e) 1^{29} [1]

(f) $\left(\dfrac{2}{4}\right)^3$ [1]

(g) $\left(2\dfrac{4}{5}\right)^2$ [2]

(h) $16^{-2/3}$ [1]

(i) $(3x^2 y^3 z^4)^4$ [1]

(8) (a) simplify $\dfrac{10}{3\sqrt{5}}$ [2]

(b) Simplify $\sqrt{396}$ [2]

(c) Simplify $-\dfrac{3\sqrt{7}}{4+\sqrt{7}}$ [4]

(d) Simplify $\dfrac{(4-\sqrt{3})(4+\sqrt{3})}{\sqrt{13}}$ [2]

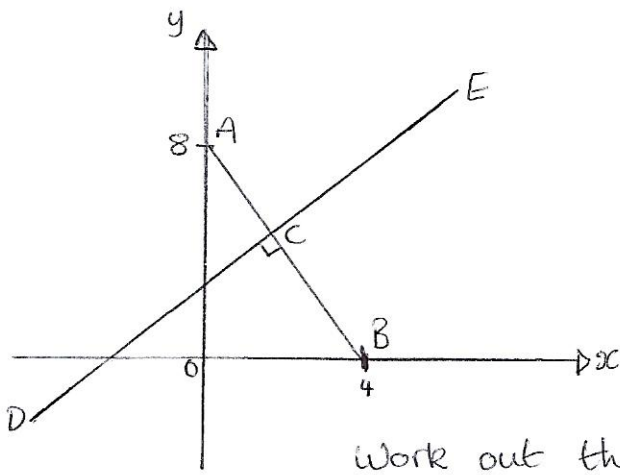(e) simplify $(\sqrt{a}+\sqrt{4b})(\sqrt{a}-2\sqrt{b})$ [3]

(f) Show that $\dfrac{1}{1+\frac{1}{\sqrt{2}}}$ can be written as $2-\sqrt{2}$ [3]

(g) Show $(1+\sqrt{3})^2$ can be written in the form $a+b\sqrt{3}$ [3]

(9) Write the following in ascending order [2]

$\sqrt{35}$ $\dfrac{20}{3}$ 2.5^2 6.83

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(10)

ACB is a straight line.
A is the point $(0,8)$
B is the point $(4,0)$
C is the midpoint of AB.
Line DCE is perpendicular to line ACB.

Work out the equation of the line DCE. [5]

(11) $f(x) = 3x + 5$ $g(x) = 2(x-1)$

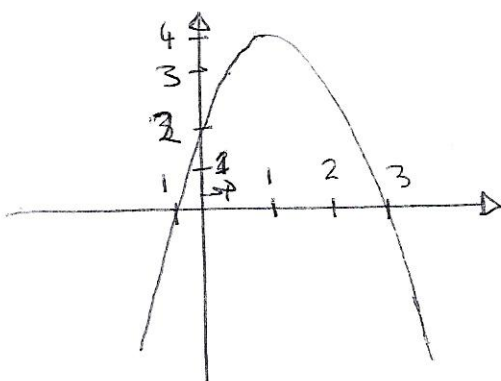(a) find $f^{-1}(x)$.   [2]

(b) find $f(g(x))$

(c) find $gg(x)$

(12) $f(x) = 2x + c$ $g(x) = cx + 5$ $fg(x) = 6x + d$ [3]
What are the values of c and d?

(13)

(a) What is the turning point of the graph? [1]

(b) What is the value of $f(3)$? [1]

(c) Where will the graph $2f(x+3)$ intercept the x-axis? [2]

(14) Describe the following transformation of the graph $f(x)$.

(i) $f(x-2)$ (ii) $f(2x)$ (iii) $2f(x)$

(iv) $-f(x)$ (v) $f(x)+2$ (vi) $f(-x)$ [3]

(15) Solve the simultaneous equations

(i) $2x - 4y = 19$ and $3x + 5y = 1$ [2]

(ii) $y = x - 3$ and $y = 2x^2 + 8x - 7$ [2]

(iii) $5x - y = 5$ and $2y - x^2 = 11$ [2]

(16) At a concert

3 adult and 4 child tickets cost £23.

1 adult and 5 child tickets cost £15.

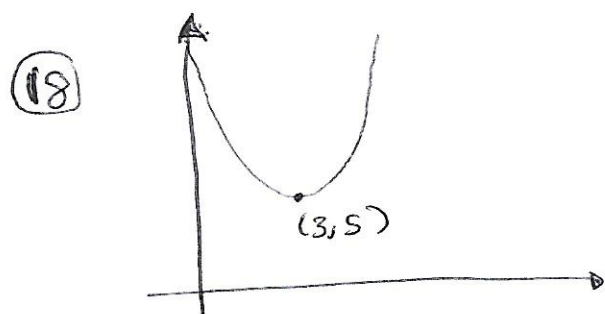Work out the cost of 2 adult and 2 childrens tickets. [4]

(17) Solve the following quadratic equations by completing the square

(i) $x^2 + 4x = 4$ [2]

(ii) $x^2 + 6x = 1$ [2]

(iii) $\frac{(x^2 + 2x)}{2} = 1$ [3]

(iv) $2x^2 + 20x + 9 = 0$ [3]

(18)

(3, 5)

The graph shows the function

$f(x) = x^2 + ax + b$.

what are the values of a and b? [3]

(19) (i) Draw a cubic graph with 2 roots.   [1]
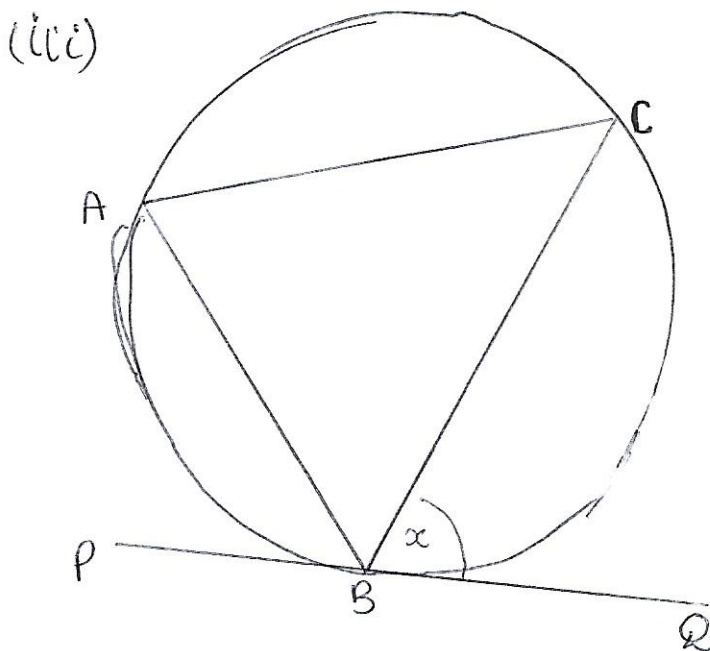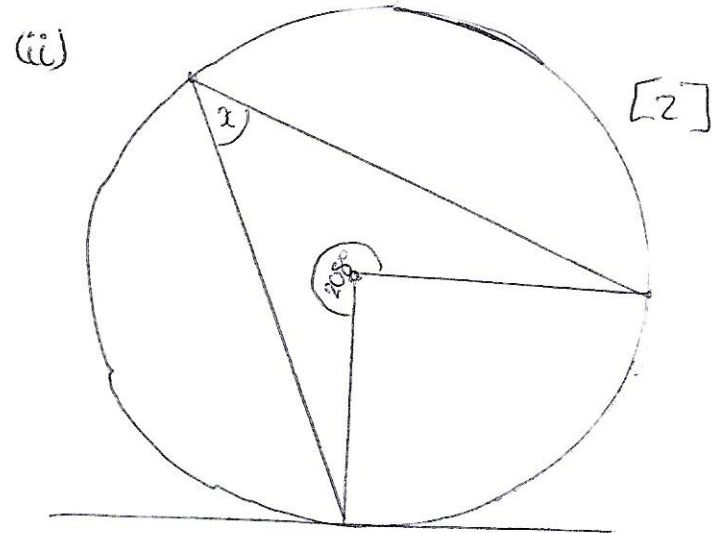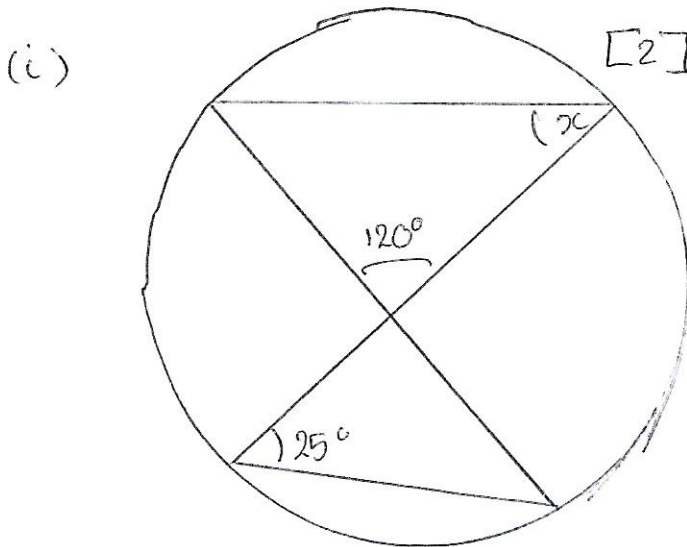
(ii) Draw a cubic graph with 1 root.   [1]

(iii) Draw a cubic graph with 3 roots. [1]

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(20) Solve the equation $2x^2+2x+3=0$, giving solutions [3] to 3 s.f.

(21) (i) The function $f(x)= 3x^2 +kx+ 3$ ~~has~~ intersects the x-axis once. What is the value of k? [2]

(ii) The equation $ax^2+ 2x - 4 = 0$ has no roots; what are the possible values of a? [2]
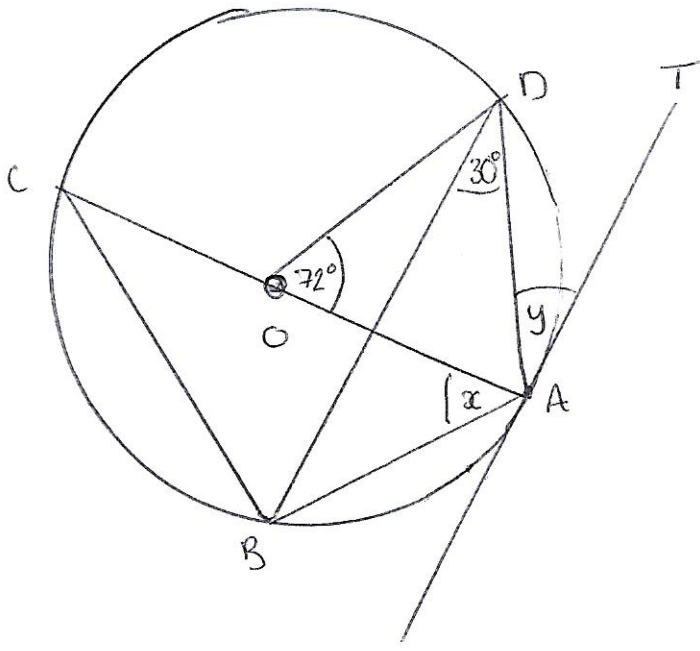
(22) find x

(i) [2]

(ii) [2]

(iii)

BC bisects angle ABQ.
PBQ is a tangent to the circle

Prove $AC = BC$
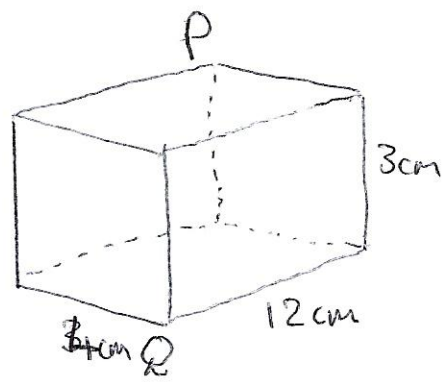
[3]

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(23)

AC is the diameter,
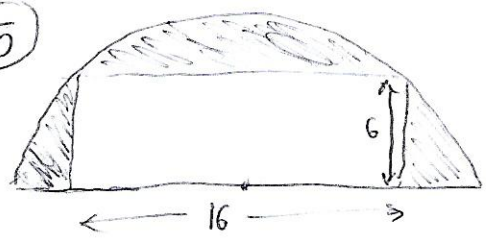AT is a tangent.

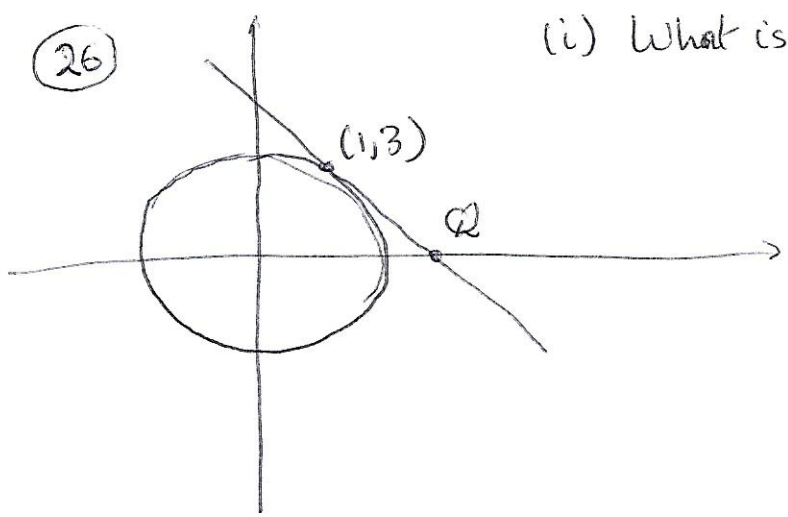Find x and y. [4]

(24)

Find the length of PQ. [2]

(25)

What is the shaded area? [3]

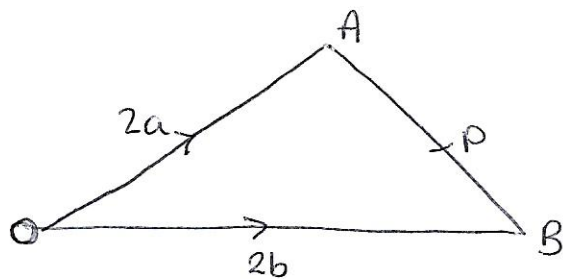(26)

(i) What is the radius of the circle? [1]

(ii) Find the point Q. [4]

(27)

The point P is on AB such that $AP : PB = 5 : 3$

$\overrightarrow{OP} = k(3a + 5b)$.

Find k. [3]

(28) Andy sometimes gets a lift to and from college.
When he does not ~~walk~~ get a lift he walks.
The probability he gets a lift to college is 0.4
The probability he walks home is 0.7.

(a) Complete a tree diagram. [2]

(b) What is the probability he doesn't get a lift to or from college? [1]

(29) A bag contains red and blue marbles.
Yasmine takes one marble at random.
The probability she takes a red one is $\frac{1}{5}$.

She returns the marble and the adds 5 more red marbles.

Now the probability she picks a red one at random is $\frac{1}{3}$.

How many of each colour were there at the start? [5]

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30 Lei is in a class of 28 students, 3 of whom are lefthanded. If the school has 1250 pupils, how many are lefthanded? [2]

31 Here are the scores of 15 basketball games.

17, 18, 18, 18, 19, 20, 20, 22, 23, 23, 23, 26, 27, 28, 28

(i) What is the mode? [1]

(ii) What is the median? [1]

(iii) What is the lower quartile? [1]

(iv) What is the upper quartile? [1]

(v) What is the range? [1]

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