Q1(1):

$2\sqrt{12} - 3\sqrt{6} \div \sqrt{18}$

$= 4\sqrt{3} - \frac{3}{\sqrt{3}}$

$= 4\sqrt{3} - \sqrt{3}$

$= \boxed{3\sqrt{3}}$

Q1(2):

$\frac{x^2-x-6}{x^2+x-2} - \frac{2x-4}{x-1}$

$= \frac{(x-3)(x+2)}{(x+2)(x-1)} - \frac{2x-4}{x-1}$

$= \frac{(x-3)-(2x-4)}{x-1}$

$= \frac{1-x}{x-1}$

$= \boxed{-1}$

Q1(3):

$\alpha^2 + \beta^2 = (\alpha+\beta)^2 - 2\alpha\beta = 2^2 - 2 \cdot 4 = \boxed{-4}$.

$$\alpha^3 + \alpha\beta^2 = -4\alpha$$

$$\alpha^3 = -4\alpha - 4\beta = -4(\alpha+\beta) = -4 \cdot 2 = \boxed{-8}$$

Q1(4):

$$x^4 - 13x^2 + 36 = 0$$

$$(x^2 - 9)(x^2 - 4) = 0$$

$$x^2 = 4, 9$$

$$x = \pm 2, \pm 3$$

Therefore, the smallest solution is $\boxed{-3}$.

Q1(5):

$$\sin^2 x - \cos x + 1 = 0$$

$$1 - \cos^2 x - \cos x + 1 = 0$$

$$\cos^2 x + \cos x - 2 = 0$$

$$(\cos x + 2)(\cos x - 1) = 0$$

$$\cos x = 1$$

$$x = \boxed{0^\circ}$$

Q1(6):

$$2\log_{10}(x - 4) - \log_{10} 4(x - 1) = 0$$

$$\log_{10} \frac{x^2 - 8x + 16}{x - 1} = \log_{10} 4$$

$$x^2 - 8x + 16 = 4x - 4$$

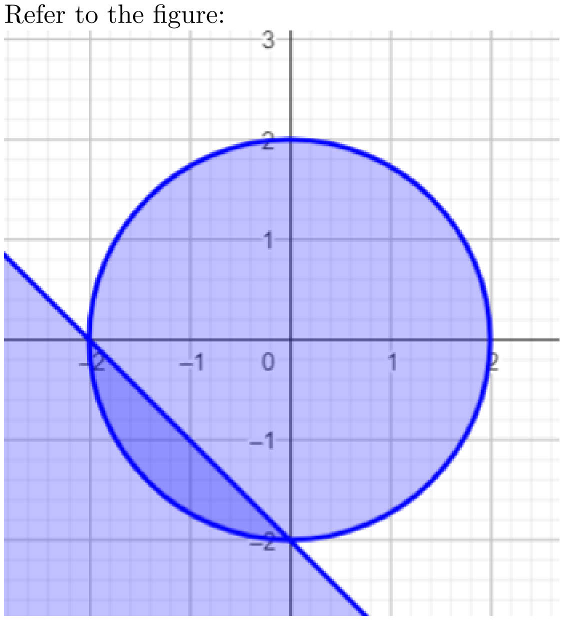
$$x^2 - 12x + 20 = 0$$

$$(x - 10)(x - 2) = 0$$

$x = \boxed{10}$ (note the hidden condition for $\log_{10}(x - 4)$ to be defined: $x > 4$)

Q1(7):

Refer to the figure:



The area of the overlapping region is equal to the area of the $\frac{1}{4}$ circle minus the area of the triangle bounded by the two radii and the chord.

Therefore, the area$=\frac{1}{4}(\pi(2)^2) - \frac{1}{2}(2)(2) = \boxed{\pi - 2}$.

Q1(8):

(i): The number of ways=$C_3^{10} = \frac{10 \cdot 9 \cdot 8}{3 \cdot 2} = \boxed{120}$.

(ii): The number of ways to choose 3 boys from 5=$C_3^5 = 10$.

The number of ways to choose 2 grils from 5=$C_2^5 = 10$.

Therefore, the required number of ways=$10 \cdot 10 = \boxed{100}$.

Q1(9):

Note that a_n is an arithmetic sequence with initial term 1 and common difference 3.

Therefore, we have the general formula $a_n = 1 + (n-1)(3)$.

$a_{30} = 1 + 3 \cdot 29 = \boxed{88}$.

Q1(10):

When $\vec{a}$ and $\vec{b}$ are vertical, $\vec{a} \cdot \vec{b} = 0$, i.e. $2x + 3 \cdot 2 = 0$, i.e. $x = \boxed{-3}$.

When $\vec{a}$ and $\vec{b}$ are parallel, we have $\vec{b} = k\vec{a}$ for some k.

Therefore, $\frac{x}{2} = \frac{2}{3} = k$, i.e. $x = \boxed{\frac{4}{3}}$.

Q1(11):

(i): $f'(x) = \boxed{3x^2 - 12x + 9}$.

To find the extremum of $f(x)$, we set $f'(x) = 0$, then $x = 3$ or $x = 1$.

$f''(x) = 6x - 12$.

As $f''(1) = -6 < 0$, $f(x)$ attains its maximum value when $x = \boxed{1}$.

(ii): To find the x-intercepts, we solve

$$x^3 - 6x^2 + 9x = 0$$

$$x(x-3)^2 = 0$$

$$x = 0, 3$$

Therefore, the required area$=\int_0^3 (x^3 - 6x^2 + 9x)$

$= [\frac{1}{4}x^4 - 2x^3 + \frac{9}{2}x^2]_0^3$

$= \frac{81}{4} - 54 + \frac{81}{2}$

$= \boxed{\dfrac{27}{4}}$

Q2:

(1): When $ODBA$ is a parallelogram, $OD//AB$ and $OA//DB$.

Therefore, we have $\frac{y-0}{x-0} = \frac{0-4}{3-2}$ and $\frac{4-0}{2-0} = \frac{0-y}{3-x}$, i.e. $4x + y = 0$......(1) and $2x - y = 6$......(2).

By (1)+(2), we have $6x = 6$, i.e. $x = \boxed{1}$.

Substitue it into (1), we have $y = -4(1) = \boxed{-4}$.

Alternative When $ODBA$ is a parallelogram, $\vec{OD} = \vec{AB} =< 1, -4 >$.

Therefore, $D = (0+1, 0-4) = \boxed{(1,-4)}$.

(2): Note that the base OB is parallel to the x-axis.

The equation of OA is $y = 2x$.

Therefore, the intersection point between it and the line $x = p$ is $(p, 2p)$.

The area of $\triangle OAB = \frac{1}{2}(3-0)(4-0) = 6$.

When the line $x = p$ bisects $\triangle OAB$, we have

$$\frac{1}{2}(p-0)(2p-0) = \frac{6}{2}$$

$$2p^2 = 6$$

$$p = \boxed{\sqrt{3}}$$

(3): The equation of AB is $y = -4x + 12$.

The intersetion points between $y = p$ and OA, AB are $(\frac{p}{2}, p)$ and $(\frac{12-p}{4}, p)$ respectively.

Therefore, the length of the base of the upper triangle$=\frac{12-p}{4} - \frac{p}{2} = \frac{12-3p}{4}$.

The area of the upper triangle$=\frac{1}{2}(\frac{12-3p}{4})(4-p) = \frac{3(4-p)^2}{8}$.

When $y = p$ bisects $\triangle OAB$, we have

$$\frac{3(4-p)^2}{8} = \frac{6}{2}$$

$$4 - p = 2\sqrt{2}$$

$$p = \boxed{4 - 2\sqrt{2}}$$

(4): Note that L is the bisector of OA.

Therefore, L passes throught the mid-point of OA, $(1, 2)$.

Using the two points form of straight line, we have L: $y = \frac{2-0}{1-3}(x-3) = \boxed{-x+3}$.

(5): Note that the axis of symmetry of the parabola is $x = \frac{3}{2}$.

Let the parabola be $y = a(x - \frac{3}{2})^2 + b$.

Substituting the coordinates of O and A into it, we have $9a + 4b = 0$......(1) and $a + 4b = 16$......(2) respectively.

By (1)-(2), we have $8a = -16$, i.e. $a = -2$.

Substitue it into (2), we have $b = \frac{16+2}{4} = \frac{9}{2}$.

Therefore, the parabola is $y = -2(x - \frac{3}{2})^2 + \frac{9}{2} = \boxed{-2x^2 + 6x}$

Q3:

(1): For $|x|$, we have $|-x| = |x|$ $\boxed{(b)}$.

(2): For x, we have $(-x) = -x$ $\boxed{(a)}$ and $(kx) = kx$ $\boxed{(d)}$.

(3): For x^2, we have $(-x)^2 = x^2$ $\boxed{b}$.

(4): For x^3, we have $(-x)^3 = -x^3$ $\boxed{(a)}$.

(5): For $x - \frac{1}{x}$, we have $(\frac{1}{x}) - \frac{1}{\frac{1}{x}} = \frac{1}{x} - x = -(x - \frac{1}{x})$ $\boxed{(c)}$.

(6): For $\sin x$, we have $\sin(-x) = -\sin x$ $\boxed{(a)}$.

(7): For $\cos x$, we have $\cos(-x) = \cos x$ $\boxed{(b)}$.

(8): For 2^x, we have $2^x \cdot 2^y = 2^{x+y}$ $\boxed{(e)}$.

(9): For 2^{-x}, we have $2^{-x} \cdot 2^{-y} = 2^{-(x+y)}$ $\boxed{(e)}$.

(10): For $\log_2 x$, we have $\log_2 \frac{1}{x} = \log_2 1 - \log_2 x = -\log_2 x$ $\boxed{(c)}$.