Q1(1):

$\log_5 0.008 = \log_5(8 \times 10^{-3}) = \log_5 5^{-3} = \boxed{-3}$.

$(\sqrt[6]{16})^3 = \sqrt{16} = \boxed{4}$

Q1(2):

$\sin 75° + \sin 120° - \cos 150° + \cos 165°$

$= \cos 15° + \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} - \cos 15°$

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

Q1(3):

By partial fraction, $\sum_{i=1}^{4} \frac{1}{(3i)(3(i+1))} = \frac{1}{9}\sum_{i=1}^{4}(\frac{1}{i} - \frac{1}{i+1})$.

Therefore, by the telescoping property, $\sum_{i=1}^{4} \frac{1}{(3i)(3(i+1))} = \frac{1}{9}(1 - \frac{1}{5}) = \boxed{\frac{4}{45}}$.

Q1(4):

$$-x < x^2 < 6$$

$$x(x+1) > 0 \text{ and } (x - \sqrt{6})(x + \sqrt{6}) < 0$$

$$(x < -1 \text{ or } x > 0) \text{ and } (-\sqrt{6} < x < \sqrt{6})$$

$$-\sqrt{6} < x < -1 \text{ or } 0 < x < \sqrt{6}$$

As $2 < \sqrt{6} < 3$, the integers satisfying the inequality are $-2, 1, 2$, totally $\boxed{3}$ integers.

Q1(5):

The first digit is choosed among 5,6,7,8,9 (totally 5 choices) and the remaining digits are the permutation of 3 numbers among the remaining 9 numbers (totally P_3^9=504 choices). Therefore, there are $5 \cdot 504 = \boxed{2520}$ such integers.

Q1(6):

Consider the dot products between $\vec{a}, \vec{b}, \vec{c}$ and $\vec{a} + \vec{b} + \vec{c}$, we have:

$$\begin{cases} 1 + \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c} = 0 \\ \vec{a} \cdot \vec{b} + 1 + \vec{b} \cdot \vec{c} = 0 \\ \vec{a} \cdot \vec{c} + \vec{b} \cdot \vec{c} + 1 = 0 \end{cases}$$

By solving, we have $\vec{a} \cdot \vec{b} = -\frac{1}{2}$.

Therefore, the angle between $\vec{a}$ and $\vec{b} = \arccos \frac{\vec{a} \cdot \vec{b}}{|\vec{a}||\vec{b}|} = 120°$.

$|\vec{a} - \vec{b}| = \sqrt{(\vec{a} - \vec{b})^2} = \sqrt{2 - 2\vec{a} \cdot \vec{b}} = \boxed{\sqrt{3}}$.

Q1(7):

The progression is given by the recurrence

$$a_{n+1} - a_n = 2^{n-1}$$

$$a_{n+1} - a_1 = \frac{2^n - 1}{2 - 1}$$

$$a_{n+1} = 2^n + 2$$

$$a_n = 2^{n-1} + 2$$

Therefore, $a_8 = 2^{n-1} + 2 = \boxed{130}$.

Solving $2^{n-1} + 2 = 1026$, we have $n = \boxed{11}$.

Q1(8):

(i): $f(-2) = 4 + 8 + 1 = \boxed{13}$.

(ii):

$$x^2 - 4x + 1 = 0$$

$$x = \boxed{2 \pm \sqrt{3}}$$

(iii): Let $\alpha = 2 - \sqrt{3}$ and $\beta = 2 + \sqrt{3}$.

Then, the area$=-\int_\alpha^\beta (x^2 - 4x + 1)dx$

$= -[\frac{1}{3}x^3 - 2x^2 + x]_\alpha^\beta$

$= -(\frac{1}{3}((\beta - \alpha)^3 + 3\alpha\beta(\beta - \alpha)) - 2(\beta + \alpha)(\beta - \alpha) + (\beta - \alpha))$

$= -(\frac{1}{3}(24\sqrt{3} + 6\sqrt{3}) - 16\sqrt{3} + 2\sqrt{3})$

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

Q1(9):

$\vec{AB} =< -1, -2, 1 >$ and $\vec{AC} =< 2, 2, 0 >$.

The area=$\frac{1}{2}|\vec{AB} \times \vec{AC}|$

$= \frac{1}{2}\left\|\begin{vmatrix} \text{i} & \text{j} & \text{k} \\ -1 & -2 & 1 \\ 2 & 2 & 0 \end{vmatrix}\right\|$

$= \frac{1}{2}| < -2, 2, 2 > |$

$= \frac{1}{2}(2\sqrt{3})$

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

Q2:

(1): Consider $\triangle ABC$, by the sine formula, we have

$$2R = \frac{BC}{\sin \angle BAC}$$

$$2R = \frac{\sqrt{3}}{\frac{\sqrt{3}}{2}}$$

$$R = \boxed{1}$$

(2): By the cosine formula, we have

$$BC^2 = AB^2 + AC^2 - 2(AB)(AC) \cos \angle BAC$$

$$3 = 5AB^2 - 2AB^2$$

$$AB = 1$$

Therefore, $AC = \boxed{2}$.

(3): $\angle BDC = \angle BAC = \boxed{60°}$.

(4): By the cosine formula, we have

$$BC^2 = BD^2 + DC^2 - 2(BD)(DC)\cos\angle BDC$$

$$BD^2 = 3$$

Therefore, $\triangle BDC = \frac{1}{2}(BD)(DC)\sin\angle BDC = \frac{1}{2}(BD^2)\sin 60° = \boxed{\frac{3\sqrt{3}}{4}}$.

(5): Note that AC is the diameter. We have $\angle ADC = 90°$ and $DA^2 = AC^2 - DC^2 = 1$.

Therefore, $\vec{DC} \cdot \vec{CA} = -CD \cdot CA \cos\angle CDA$

$= -\frac{CD^2+CA^2-DA^2}{2}$

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

$= \boxed{-3}$

Q3:

(1): As the parabola is convex upwards, we have $a \boxed{<} 0$.

(2): As the parabola has two x-intercepts, we have $\Delta = b^2 - 4ac > 0$.

Therefore, $4ac - b^2 \boxed{<} 0$.

(3): When $x = 1$, the parabola takes value smaller than 0.

Therefore, we have $a + b + c \boxed{<} 0$.

(4): When $x = -2$, the parabola takes value smaller than 0.

Therefore, we have $4a - 2b + c \boxed{<} 0$.

(5): As the y-intercept of the parabola is smaller than 0, we have $c < 0$.

Therefore, $\frac{c}{a} \boxed{>} 0$.

(6): By completing the square, $y = a(x + \frac{b}{2a})^2 + c - \frac{b^2}{4a}$.

As the axis of symmetry $x = -\frac{b}{2a}$ lies in the region $x > 0$, we have $-\frac{b}{2a} > 0$,

i.e. $\frac{b}{a} \boxed{<} 0$.

(7): As the axis of symmetry is $x = -\frac{b}{2a} > 2$, we have $b + 4a \boxed{>} 0$.

(8): As $b + 4a > 0$ and $a < 0$, we have $b + 2a > -2a \boxed{>} 0$.