

1a

route	time
RABCR	17
RACBR	21
RBACR	18
RCRBRAR	18
RCRBAR	16
RBRACR	20
RARBCR	19

I choose the route of 'RCRBAR' to deliver the food because it takes the shortest time. The time required for each route is shown in the table. The forward and backward time for the same route is the same. Since R is very close to C, and the round trip time is less than A to C or B to C, so to go to C should go from R to R. For A and B, the time from A to B is 5 minutes. The time from A or B round trip is relatively longer, so we should choose the route from RCRBAR. It takes 16 minutes in total. If we choose not to return to R during the riding, RABDR is the shortest time to go through the three places of ABC. Because AC takes the longest time, so taking AB and BC, RABDR takes a total of 17 minutes, which is longer than route we chose. So RCRBAR is the optimal.

1b

Because we need to go to school, so we need to choose BC, according to the table, the most efficient path to include BC is 'RABCR'. Thus, I choose the route of 'RABCR' to deliver the food and come to decision the route to the primary school. It takes 17 minutes in total.

2a

route	time
RABCR	14
RACBR	17
RBACR	17
RCRBRAR	20
RCRBAR	17
RBRACR	20
RARBCR	17

I choose the route of 'RABCR' to deliver the food because it takes the shortest time. The time required for each route is shown in the table. The forward and backward time for the same route is the same. After 3 months, the time required for each route has changed. The time for RC and RA is very short, so choose both as far as possible. RB and AB have the longest time, so try to choose less. According to the table lists all the situations, it can be seen that the time of RABCR is the shortest, so this is the optimal path. It takes 14 minutes.

2b

Because we need to go to school, the school is on the line BC, so we need to go through the school, we should choose BC, according to the table, the most efficient path to include BC is 'RABCR'. Thus, I choose the route of 'RABCR' to deliver the food and come to decision the route

to the primary school. It takes 14 minutes in total.

3a

route	time
RABCR	$w+x+z+v$
RACBR	$w+y+z+u$
RBACR	$w+x+y+v$
RCRBRAR	$2v+2u+2w$
RCRBAR	$2v+u+x+w$
RBRACR	$2u+w+y+v$
RARBCR	$2w+u+z+v$

The time required for each route is shown in the table. The forward and backward time for the same route is the same. In future, the time required for each route has changed. The specific value of each route is unknown and is represented by letters. The time of all routes is shown in the table. The most effective path is the minimum value of the table.