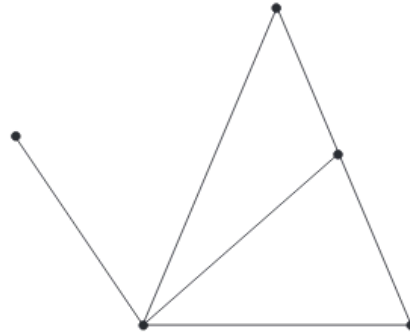


Networks – NESAs

1.

The diagram shows a network.



What is the sum of the degrees of the vertices in this network?

- A. 5
- B. 10
- C. 11
- D. 12

2.

In a town, there are four petrol stations W , X , Y and Z . The table shows the length, in metres, of roads connecting these petrol stations.

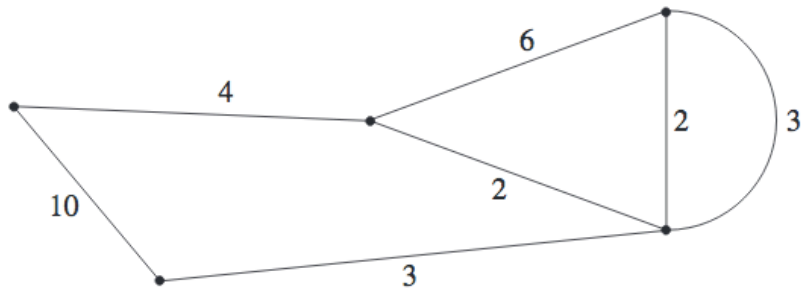
	W	X	Y	Z
W	–	650	–	280
X	650	–	500	220
Y	–	500	–	340
Z	280	220	340	–

A petrol tanker needs to visit each station.

What is the shortest distance it can travel if it starts at Station W ?

- A. 840 m
- B. 1000 m
- C. 1120 m
- D. 1270 m

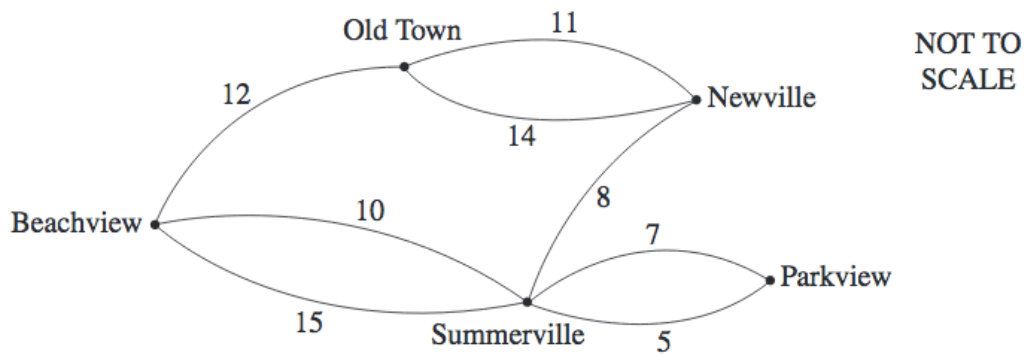
3. A weighted network diagram is shown below.



What is the weight of the minimum spanning tree?

- A. 10
- B. 11
- C. 12
- D. 14

4. This diagram shows the possible paths (in km) for laying gas pipes between various locations.



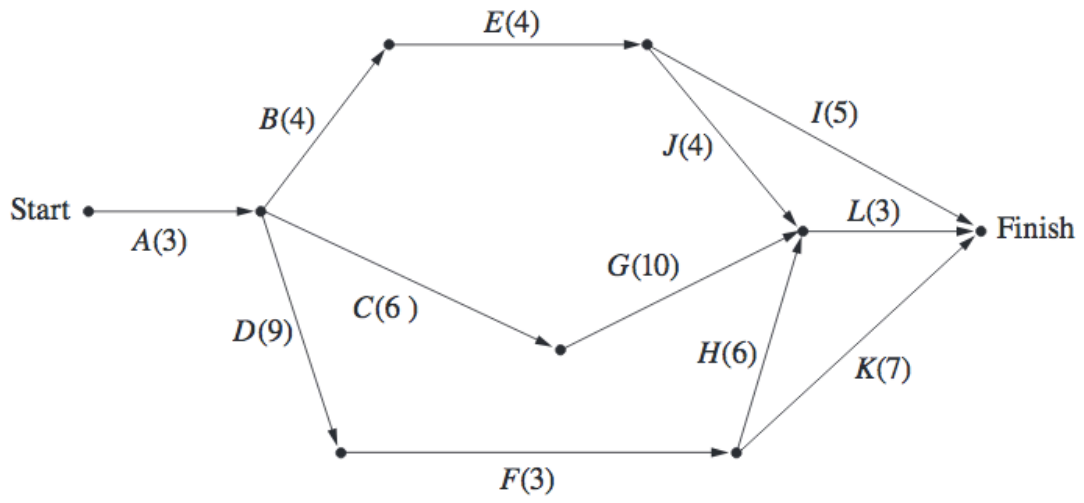
Gas is to be supplied from one location. Any one of the locations can be the source of the supply.

What is the minimum total length of the pipes required to provide gas to all the locations?

- A. 32 km
- B. 34 km
- C. 36 km
- D. 38 km

5.

The organisation of a school formal involves activities A to L. The diagram shows these activities and their completion times in days.



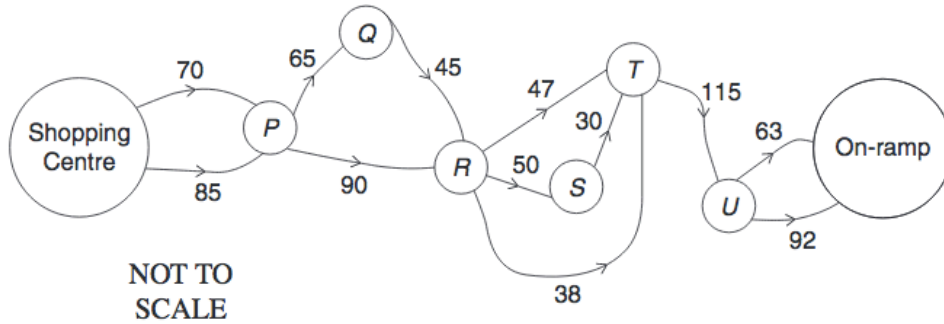
The minimum completion time for the activities is 24 days.

What is the float time of Activity E?

- A. 0
- B. 6
- C. 8
- D. 13

6.

The network diagram represents a system of roads connecting a shopping centre to the on-ramp of a freeway. Traffic moves via several routes. For example, there are two routes from the shopping centre to P and one route from T to U . The number on the edge of each road indicates the number of vehicles that can travel on it per hour.



At present, the capacity of the network from the shopping centre to the on-ramp is not maximised.

Which additional road(s) would increase the network capacity to its maximum?

- A. A road from P to U with a capacity of 20 vehicles per hour
- B. A road from Q to T with a capacity of 20 vehicles per hour
- C. A road from R to T with a capacity of 20 vehicles per hour and a road from T to U with a capacity of 40 vehicles per hour
- D. A road from Q to U with a capacity of 20 vehicles per hour and a road from S to U with a capacity of 20 vehicles per hour

7.

In a town, there are four petrol stations W , X , Y and Z . The table shows the length, in metres, of roads connecting these petrol stations.

	W	X	Y	Z
W	–	650	–	280
X	650	–	500	220
Y	–	500	–	340
Z	280	220	340	–

- (a) Construct a network diagram to represent the information in the table. 2
- (b) A petrol tanker needs to refill each station. It starts at Station W and visits each station. 2

Calculate the shortest distance that can be travelled by the petrol tanker. In your answer, include the order that the petrol stations are refilled.

8.

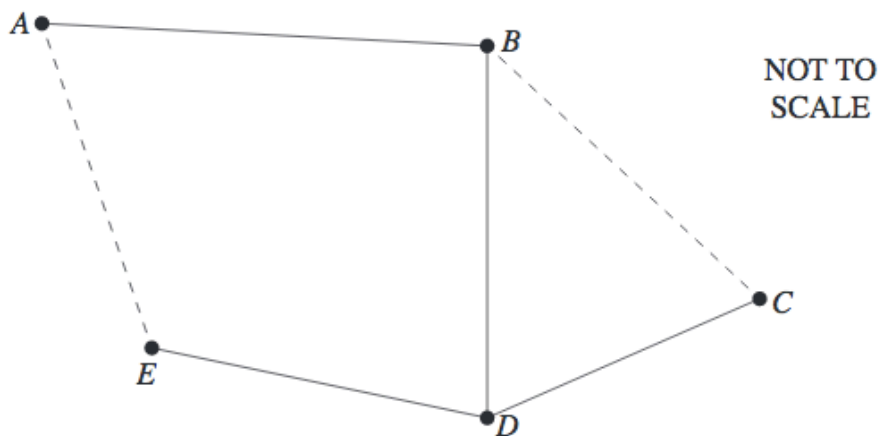
A park has five areas, A , B , C , D and E , which are connected by pathways.

4

The table shows the length of some of the pathways, in metres.

	A	B	C	D	E
A	–	600	–	–	?
B	600	–	?	500	–
C	–	?	–	400	–
D	–	500	400	–	300
E	?	–	–	300	–

The following network diagram is drawn to represent this information and a correct minimum spanning tree is shown by the solid lines.

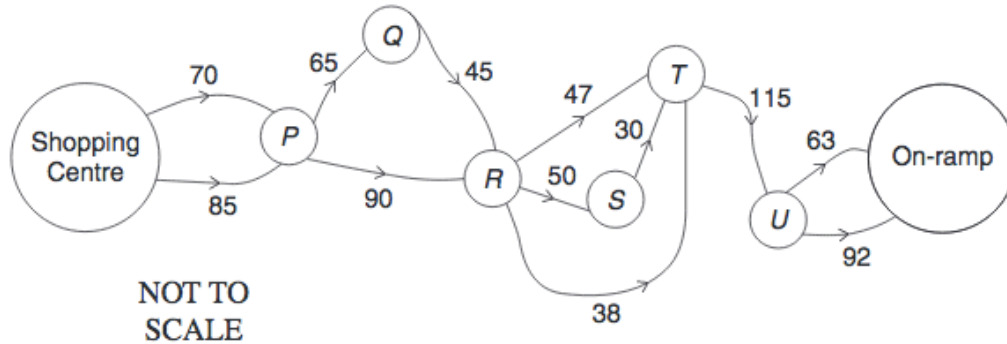


Complete the network diagram including a possible value for each of the two edges AE and BC , and justify why AE and BC were not included as part of the minimum spanning tree.

9.

3

The network diagram represents a system of roads connecting a shopping centre to the on-ramp of a freeway. Traffic moves via several routes. For example, there are two routes from the shopping centre to *P* and one route from *T* to *U*. The number on the edge of each road indicates the number of vehicles that can travel on it per hour.



At present, the capacity of the network from the shopping centre to the on-ramp is not maximised. It is not possible to construct a road directly between the shopping centre and the on-ramp.

Suggest ONE way that the network capacity can be maximised with additional road(s). Justify your answer.

10.

5

A project requires activities *A* to *G* to be completed, as shown in the table.

Activity	Immediate prerequisite(s)	Duration in days
<i>A</i>	–	?
<i>B</i>	–	15
<i>C</i>	<i>A</i>	?
<i>D</i>	<i>A, B</i>	20
<i>E</i>	<i>D</i>	8
<i>F</i>	<i>C, E</i>	?
<i>G</i>	<i>D</i>	?

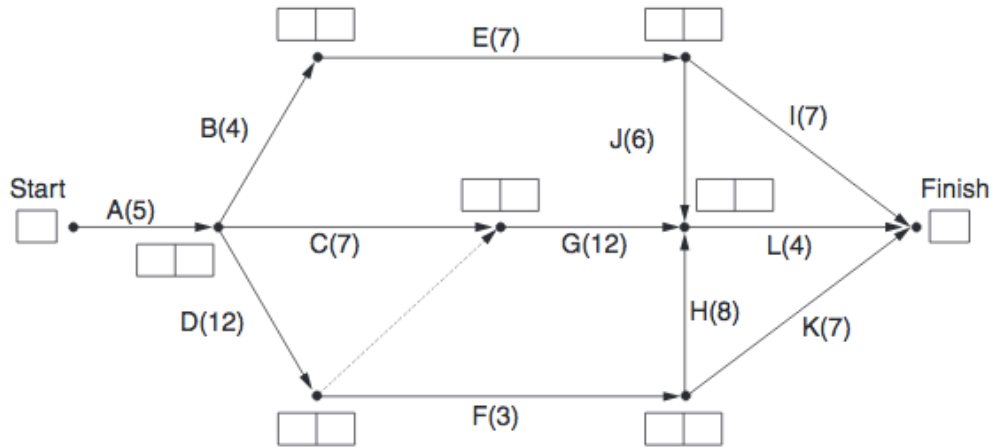
The minimum completion time for the project is 50 days and the critical path includes activities *B, D, E* and *F*. The float for *G* is three days and the float for *C* is 8 days.

Find a possible duration for each of the activities *A, C, F* and *G*. Include a network diagram in your answer.

11.

Steven and Mary are renovating a bathroom. The renovation involves activities A to L.

The network diagram shows these activities and their completion times in days.



- (a) Which TWO activities immediately precede activity G? 1
- (b) By completing the diagram shown, calculate the minimum time required to complete the renovation. 2
- (c) Hence, what is the float time for activity E? 1