THINKING SKILLS   **9694/12**

Paper 1 Problem Solving   **October/November 2018**

                                        1 hour 45 minutes

Additional Materials: Multiple Choice Answer Sheet
                        Soft clean eraser
                        Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

There are **30** questions on this paper. Answer **all** the questions.

For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet. Ignore responses numbered 31–40 on the answer sheet.

DO **NOT** WRITE IN ANY BARCODES.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

This document consists of **16** printed pages.

International Examinations

[Turn over

1 Gemma is on a coach trip. After a short sleep, she has woken up just in time to see this sign on the side of the motorway:

Targen	7 km
Rybu	24 km
Pozta	32 km
Yxon	43 km
Larpe	59 km

The last thing she remembers seeing before she fell asleep is this sign:

| Omiddan	11 km
Pepashir	20 km
Meradel	35 km
Targen	46 km
Rybu	63 km

How far has the coach travelled while Gemma has been asleep?

A 4 km

B 17 km

C 39 km

D 56 km

2 Monthly sales of new cars in Illyria are always highest in March and September. At the end of each month, the sales figures from the 1st January up to the end of that month are recorded. These figures are then presented on a chart.

Which of the four charts below could represent the car sales in Illyria?

A

B

C

D
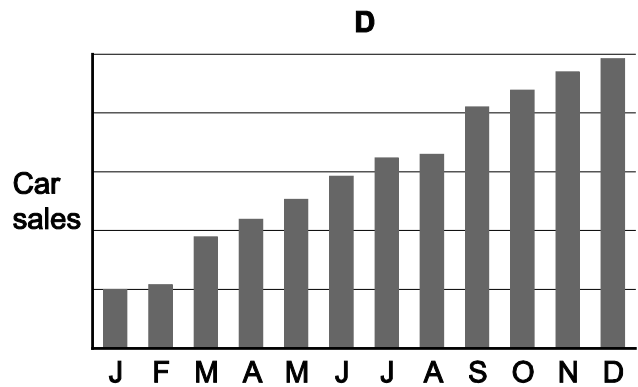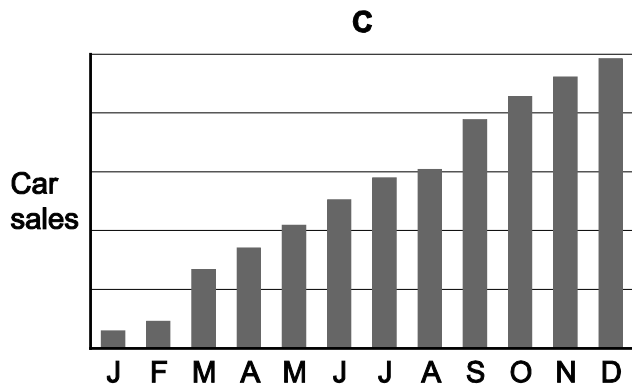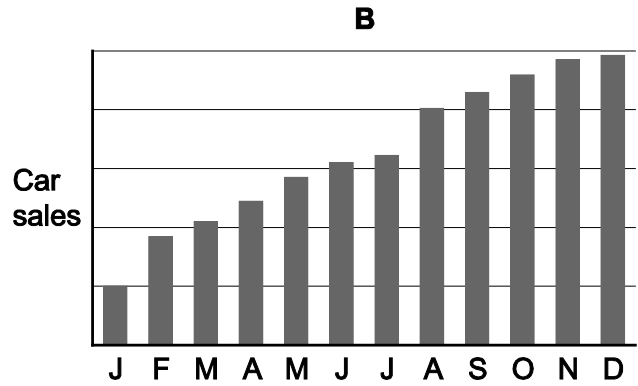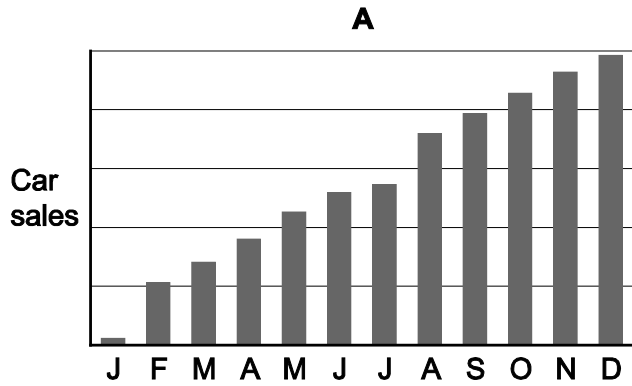
3 This morning I took my three children to an internet café.

Jay used the internet for 37 minutes and was charged $17.40, whilst Kay's 56 minutes cost $20.25 and Harry had to pay $19.05 for the 48 minutes that he spent online.

Which of the following formulae does this café use to charge for its internet facilities?

A $4.65 + $0.30 per minute

B $8.15 + $0.25 per minute

C $9.05 + $0.20 per minute

D $11.85 + $0.15 per minute

4 Andy wants a challenge and he has decided to cycle from Jamestown to Country End, a distance of 1600 km. He never cycles more than 150 km each day, but in order to conserve his energies, he has decided on the following restrictions:

- After he has cycled 150 km for each of two consecutive days he will cycle only 75 km the next day.
- On Saturdays he will cycle only 75 km and on Sundays he will have a rest day.
- On each day he will cycle the maximum permitted within these restrictions.

Andy will leave Jamestown early on a Wednesday morning.

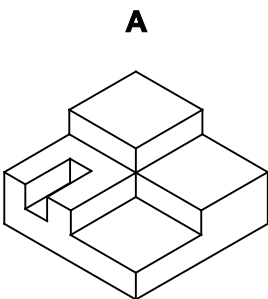If he completes the ride without any unexpected delays, on what day of the week will Andy arrive in Country End?

A Monday

B Tuesday

C Wednesday

D Thursday

5 The solid block below is shaped so that it will interlock with another solid block to form a cube.
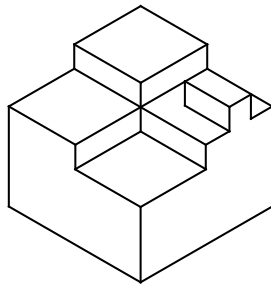
Which of the solid blocks below, together with the block above, will form a solid cube?

A **B** **C** **D**
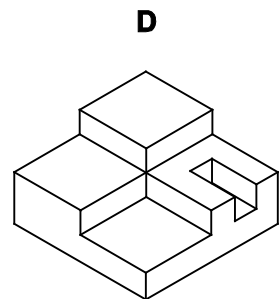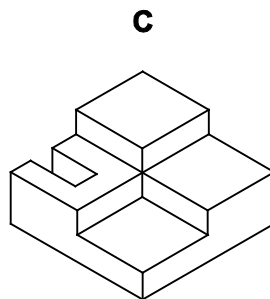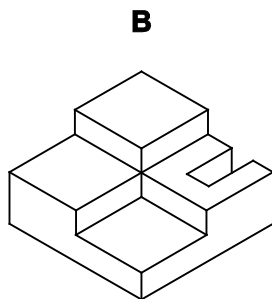
6 A child's toy consists of four interlocking wooden wheels with fixed centres and 10, 15, 20 and 40 identical teeth. The wheel on the left has a handle as shown and the wheel on the right has a star marked at A.
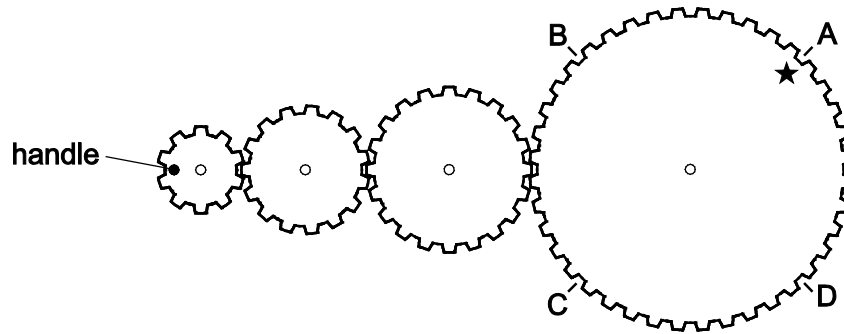
Fred uses the handle to turn the wheel on the left through 3 complete turns clockwise.

In which position does the star finish?

A Position A

B Position B

C Position C

D Position D

7 I want to attend one football match this month. Since I want to see a good match, I have decided to see a team who finished within four places of my team last year. My team finished 8th last year. I also want to watch an away game, but would like to travel the shortest distance possible to reach the game. I have summarised the information about this month's matches for my team in the table shown below.

	Wednesday game				Saturday game			
Week	Location	Distance to travel (km)	Ticket price ($)	Opponent's position last year	Location	Distance to travel (km)	Ticket price ($)	Opponent's position last year
1	Home	2	40	17	Away	21	50	1
2	Away	52	38	5	Away	32	42	11
3	Home	2	35	9	Home	2	45	14
4	Away	14	47	2	Home	2	40	7

Which match will I go to see?

A Week 1 Saturday

B Week 2 Wednesday

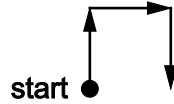**C** Week 2 Saturday

D Week 3 Wednesday

8 A child's robot is programmed using the three commands:
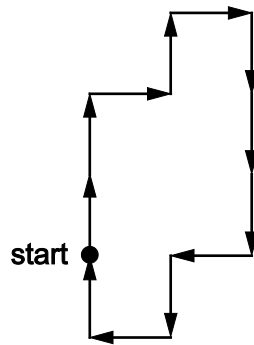
> F: take one step forward
> R: turn right 90 degrees and take one step forward
> L: turn left 90 degrees and take one step forward

For example, the command FRR would lead to the journey shown below (viewed from above):

The robot is given a new command which makes the journey shown below.

Which of the following statements is true for the command that makes this journey?

A   F is always immediately followed by R

B   R is always immediately preceded by F

C   L is always immediately followed by R

D   R is always immediately preceded by L

9 Cabbi Taxis used to charge $7.50 per journey, plus 40¢ per ½ kilometre or part of ½ kilometre.

Recently the company has changed its fare structure and now charges $10 for all journeys of 5 kilometres or less, plus an extra $1 for every further kilometre or part of a kilometre.

Whenever I travel by train I hire Cabbi Taxis to take me to the station, a journey of 11.3 kilometres.

How much more or less than previously does my journey to the station now cost?

A   70¢ more

B   30¢ more

C   10¢ less

D   20¢ less

10 Jack has decided that he would like to improve his Japanese and is considering a number of options that are available to him. The options are summarised in the table below.

Option	Initial cost	Monthly price	Time	Levels available
Computer programme	$200	N/A	Any time	Beginner, Intermediate, Advanced
Lessons at local college	$20	$30	Mondays 18:00 – 19:00	Beginner
		$15	Fridays 13:00 – 14:00	Intermediate
		$35	Thursdays 19:00 – 20:00	Intermediate
		$25	Tuesdays 10:00 – 11:00	Advanced
Online course	N/A	$45	Any time	Beginner, Intermediate, Advanced

Jack needs an Intermediate course starting immediately and lasting for six months. He can afford to pay up to $50 in total in any month. As he works between 09:00 and 17:00 each day Monday to Friday he needs a course that is not within these times.

What is the cheapest total cost that Jack could pay for his course?

A $110

B $200

C $230

D $270

11
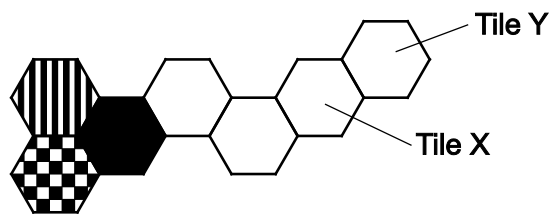
Anita is tiling her bathroom walls. She is using hexagonal tiles which are all either plain black, black and white striped, or chequered. She is making sure that no two adjacent tiles have the same pattern.

What patterns will tiles X and Y be?

A Tile X will be striped and tile Y will be plain black

B Tile X will be chequered and tile Y will be striped

C Tile X will be plain black and tile Y will be striped

D Tile X will be striped and tile Y will be chequered

12 The living room of my house contains a mirror which is positioned so that I can see a reflection of the digital clock when I am standing in the hallway. For example, at 12:15 I can see the following:

I have to be careful, because if I forget that it is a reflection I might think that it is 21:51.

On the next occasion that the mirror appears to show a real time, what time will be shown in the mirror?

A 05:51

B 12:20

C 15:51

D 21:52

13 After Ken's funeral, his wife Helen decided to offer his collection of CDs to members of his local Jazz Club.

As there were so many CDs, it was not possible to take all of them to the first meeting of the club; so 60% of the collection was put into a box, from which members could take the ones they wanted. By the end of the meeting half of these had been taken.

A week later, a further 30% of the original collection was added to the box. During this meeting, three quarters of the CDs in the box were taken.

At the third meeting, the rest of the collection was added to the box. There were now 40 CDs for the members to choose from.

How many CDs were there in the original collection?

A 64

B 160

C 250

D 400

14 A newspaper runs a new game called *newdoku*. Three different letters are written on a 4 x 4 grid and the totals of three of the lines are given. From these the value of each letter and hence the total of each line can be worked out. This is today's game:

| Y	X	Z	Y	?
Y	X	X	Y	100
Z	X	Y	X	
X	Y	Z	Z	140
	90			

What is the total of the top row of the grid?

A 115

B 120

C 125

D 130

15 The 'Healthy Options' shop serves a range of organic foods. The manager has employed a new assistant and has asked her to prepare 30 kg of their standard 'nut and raisin' mix, which should consist of 30% peanuts, 20% hazelnuts and 50% raisins. The assistant has, however, made a mix using 10 kg of each. The manager told her to add the minimum amount of extra ingredients to make the proportions right.

What should be the mass of the final mix (to the nearest 1 kg if necessary)?

A 30 kg

B 33 kg

C 40 kg

D 50 kg

16 Fred has four identical cubes. Each cube has four faces that are painted white and two faces that are painted grey. On each cube the grey faces are opposite each other. Fred has placed the four cubes together on a table. One view of the cubes on the table is shown below.
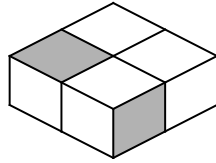
Which of the following could show a different view of the four cubes on the table?

A	B	C	D
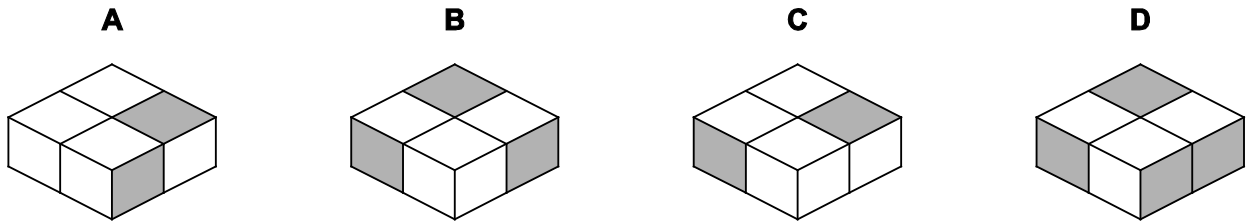
17 The Megadough bread company bakes its loaves in a large oven. The loaves are equally spaced on a steel conveyor belt and take 24 minutes to move through the oven. 80 loaves are baked every hour.

How many loaves are in the oven at a time?

A   4

B   18

C   32

D   200

18 Mary has been sent out with $2.50 to buy cakes and pastries for a birthday party. Cakes cost 21¢ and pastries cost 18¢. She has been told to spend as much as possible of the $2.50. If she finds more than one way of doing this, she should choose the option which has the numbers of cakes and pastries as close together as possible.

How many more of one thing does she buy than the other?

A   2

B   3

C   5

D   10

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19 When identical drinking cups are stacked, 6 of them reach a height of 12 cm, and 10 of them reach a height of 15 cm, as shown in the sketch below.
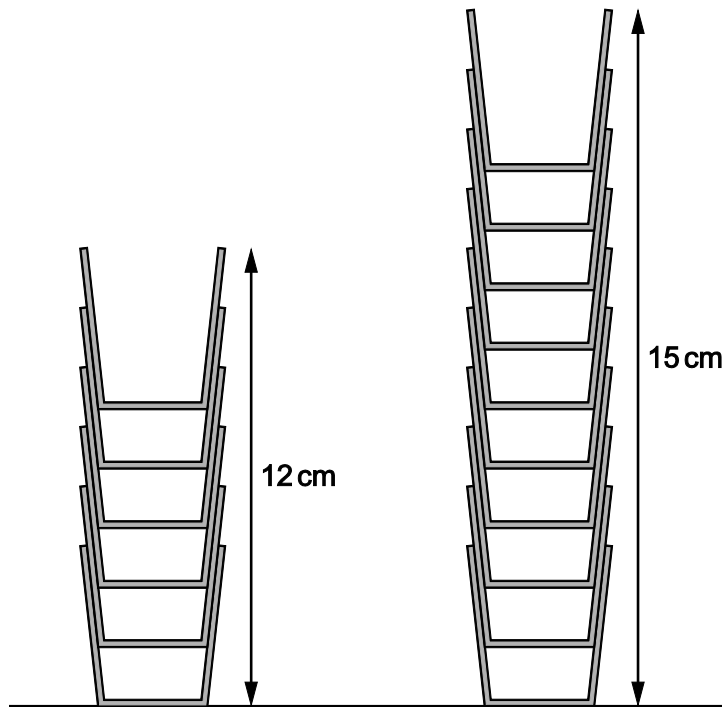

How high will a stack of 2 cups reach?

A 1½ cm

B 4 cm

C 8¼ cm

D 9 cm

20 Simon has seven credit cards. Each card's 4-digit PIN contains three 2-digit multiples of 13. For instance, the PIN for one of his cards is 3913 (which contains 39, 91 and 13).

Which one of the following statements is **not** necessarily true?

A At least two of Simon's cards have the same PIN

B Each PIN consists of either odd digits only or even digits only

C None of the PINs contains the digit 7

D The last digit of each PIN is the same as its first digit

21 On a building site, each day some bricks are used up in the construction and some bricks are delivered. The numbers of bricks used and delivered each day during one week are shown in the charts below, which are drawn using the same scale.
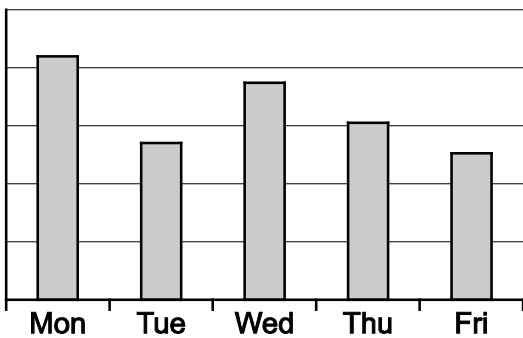
Number of bricks used up
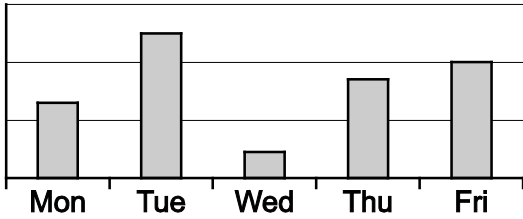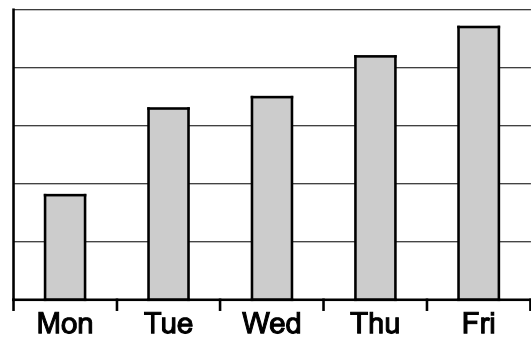
Number of bricks delivered
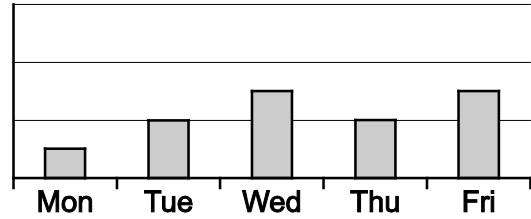
Which one of these charts could show the total number of **unused** bricks on the site at the end of each day?
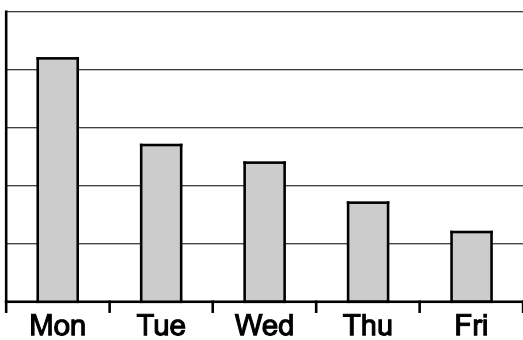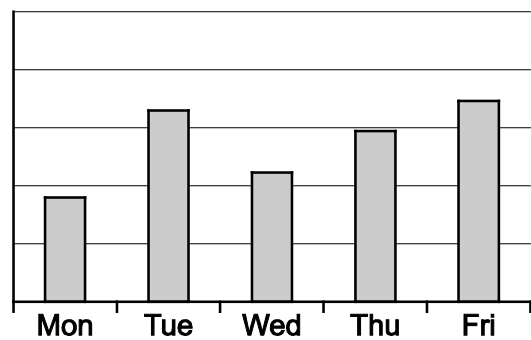
A

B

C

D

22 Dogs and cats have shorter lives than humans. A vet estimates that a dog ages 6 times as fast as a human for the first 3 human years of its life and 4 times as fast thereafter. The same vet estimates that a cat ages 7 times as fast as a human for the first 4 human years of its life and 3 times as fast thereafter.

I was born exactly three years before my cat and my dog.

Using the vet's estimates, how much 'older' than me will they be when they are the same age as each other?

A 24

B 33

C 36

D 39

23 A farmer has two plots of land and needs to decide which vegetables would yield the most return through the growing season. Whenever he plants a vegetable in one of his plots it occupies the whole plot. The options for which vegetables he could grow, along with their growing seasons, are shown in the table below.

	Growing season											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lettuce					░	░	░	░	░			
Tomatoes					░	░	░	░	░			
Potatoes		░	░	░	░	░	░	░	░	░		
Beans				░	░	░	░	░	░			

The following table shows the growing times for each vegetable along with the amount of revenue that can be derived for each crop from one plot of land. The retailer has requested at least two vegetables from the farmer.

	Planting to Harvesting time	Yield ($)
Lettuce	2 months	200
Tomatoes	3 months	150
Potatoes	5 months	300
Beans	3 months	350

Which combination of vegetables will give the highest yield?

A Beans, potatoes and tomatoes

B Beans, lettuce, potatoes and tomatoes

C Beans and lettuce

D Beans and potatoes

24 A dance is made up of a sequence of identical 'phrases'. In each phrase, each of the eight dancers begins in one of the eight positions shown below:

```
 12
8  3
7  4
 65
```

At the end of the phrase, the dancer who started in position 1 has moved to position 3. The diagram below shows where all of the dancers have moved to.

```
 75
6  1
3  8
 24
```

After how many phrases are all the dancers in the same position as they were at the start of the dance?

A   3

B   5

C   8

D   15

25 Ashley's 8-digit passcode to unlock his laptop is made up of the month and year of his birth followed by his age at the end of the year 2000.

He has two sisters, one who is older than him and one who is younger than him. He recently discovered that both of them have passcodes made up in exactly the same way as his. His older sister's passcode is 10196436 and his younger sister's passcode is 03197129.

Unlike his sisters, however, the 8 digits of Ashley's passcode are all different.

What is the last digit of Ashley's passcode?

A   2

B   4

C   6

D   8

26 All of the students in their final year at a university were asked whether they own a bicycle and whether they own a car. 48% of the students said that they own a bicycle and 36% said that they own a car.

Which of the following statements is **not certain** to be true?

A At least 12% of the students own a bicycle but do not own a car

B At most 75% of the students who own a bicycle also own a car

C The number of students who own a bicycle is more than the number who own neither a bicycle nor a car

D The number of students who own both a bicycle and a car is less than the number who own neither

27 A polar explorer will burn 40 calories per day for each kilogram (kg) of the combined weight of himself and his sledge. Each day's ration of food weighs 1 kg and contains 5600 calories; he eats his entire ration for the day at the end of each day. The explorer will lose 1 kg in body weight on each day that he burns at least 1000 calories more than he consumes.

Ranulph is about to begin a 6-day expedition in the Arctic. He weighs 80 kg and his sledge weighs 90 kg, including his rations.

What will be the combined weight of Ranulph and his sledge at the end of the 6th day?

A 158 kg

B 159 kg

C 161 kg

D 164 kg

28 James is going to see a film at the cinema this evening. For both the journey to the cinema and the journey home James will take the bus. The buses run at 30-minute intervals in both directions. It takes 20 minutes for the bus to travel between the stop outside James's house and the stop by the cinema.

James will take the latest bus that gets him to the cinema at or before 20:00 and the first bus home after 22:05.

Which of the following additional pieces of information would be sufficient to work out the time between James getting on the bus to go to the cinema and getting off the bus having returned home?

A 15 minutes after any bus passes James's house, another passes in the opposite direction

B The first bus that James will be able to get to return home will leave at 22:30

C The gaps between buses passing the cinema in either direction are 5 minutes and 25 minutes

D The latest bus that will get James to the cinema on time will leave James's house at 19:25

29 Jenny, Kim, Lance, Mary and Nathan were the contestants in a recent talent competition. After they had all performed, each of the six judges awarded 9 points to one of them, 5 points to another and 2 points to a third.

Mary was the only contestant who received points from all six judges, but she was second overall, 8 points behind Kim.

What is the greatest number of points that Mary could have received?

A 30

B 33

C 34

D 37

30 It takes 2 kg of *adamite*, 5 kg *beryzone*, and 10 kg of *calcalcal* to make a *stickyton*. Having no stock left of any of them, the factory making stickytons is just about to receive a delivery of adamite, beryzone and calcalcal. The manager would like to calculate the maximum number of stickytons the factory will then be able to make.

Which one of the following sets of information about the delivery, by itself, would be sufficient to allow the manager to calculate this?

A There is 400 kg of adamite, 2000 kg of calcalcal, and there is more beryzone than adamite but less beryzone than calcalcal

B There is 800 kg of beryzone, and there is five times as much calcalcal as adamite, and more calcalcal than adamite and beryzone taken together

C There is 400 kg of adamite, 800 kg of beryzone, and more than four times as much calcalcal as adamite

D There is 2000 kg of calcalcal, and there is twice as much beryzone as adamite, and more than twice as much calcalcal as beryzone