Carlingford High School

Year 11 Standard Mathematics

Term 1 Assessment Task 2019

Time allowed: 50 minutes

Name: _____

Circle your teacher's name:

Mrs Lobejko Mrs Lego Mr Fardouly Miss Aung

Instructions

- All questions should be attempted.
- Show ALL working on the exam paper in the space provided.
- Marks may not be awarded for careless or badly arranged work.
- Only board-approved calculators may be used.

Section	Mark
(A) Classifying and Representing Data	/ 24
(B) Formulae and Equations	/ 22
TOTAL	/ 46

Section A: Classifying and Representing Data

Mark

Q 1) A study on the driving habits of NSW Learner License holders is to be conducted. Data is to be collected using a questionnaire.

a) One question that will be asked is: **1**

"How often do you listen to music while driving? (circle one) Always Sometimes Never"

The data collected by this question would be classified as:

A Categorical, nominal

B Categorical, ordinal

C Quantitative, discrete

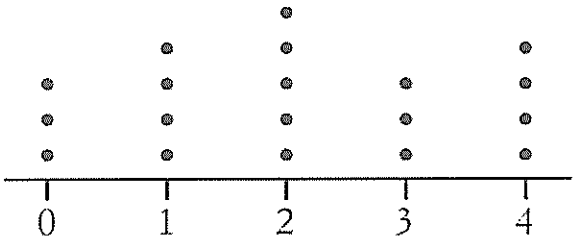
D Quantitative, continuous

b) Who would be surveyed if it is decided to use a census for the study? **1**

_____

_____

Q 2) Police Officer Smith conducted Random Breath Testing (RBT) on a particular day. For each car that Officer Smith stopped for RBT, the number of passengers in the car was noted. The results are shown in the dot plot below.



a) How many cars did Officer Smith stop for RBT? **1**

_____

_____

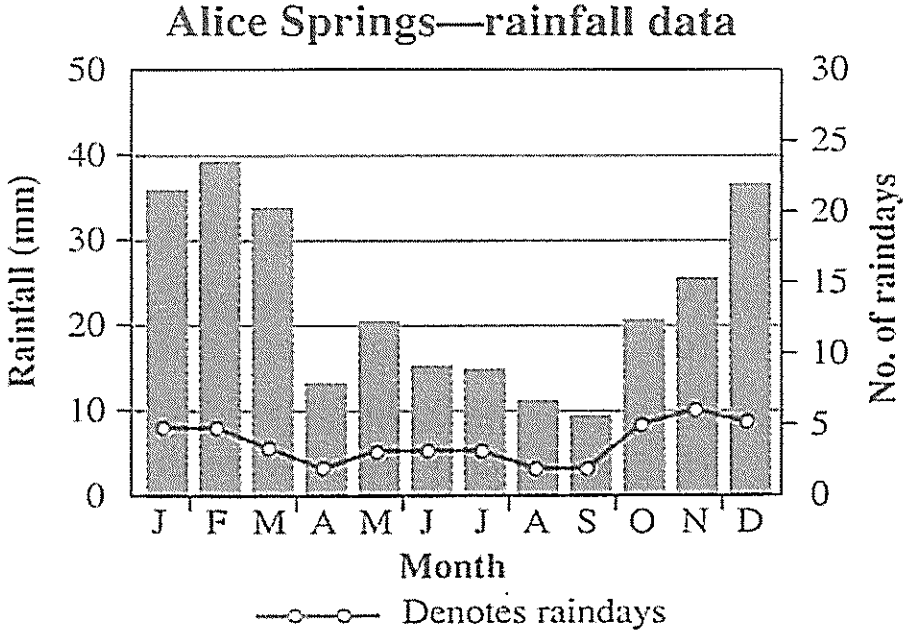
b) What percentage of the cars stopped had at least 3 passengers? Answer to the nearest percent. **1**

_____

_____

_____

Q 3) This graph from the Bureau of Meteorology gives rainfall information for Alice Springs.



a) Approximately how much rainfall was there in May? **1**

_____

_____

b) Considering both the rainfall and number of raindays, in which month would most people travel to Alice Springs? **1**

_____

_____

Q 4) The student enrolment at Achievement High School is shown in the table.

Year	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Number of Students	225	232	233	230	150	130	1200

Jason wants to survey 180 students from the school. If he wishes to use a stratified sample based on year groups, how many students from Year 8 should be surveyed? **2**

_____

_____

_____

_____

_____

_____

Q 5) A factory produces 140 refrigerators in a day.

a) At what interval should refrigerators be selected for a quality check if a systematic sample of 7 refrigerators is required each day? **1**

b) Using your result from part (a), if the first refrigerator selected is number 22, write the number, in order, of each refrigerator that would be selected for the sample. **2**

Q 6) An incomplete grouped data frequency distribution table is shown.

Class interval	*Class centre*	*Frequency*
0 – 14	7	
15 – 29		9
30 – 44	37	24

a) Find the class centre for the class interval 15 – 29. **1**

b) The relative frequency of the class interval 30 – 44 was found to be $\frac{8}{17}$. **2**

Find the frequency of the class interval 0 – 14.

Q 7) Barry constructed an ordered back-to-back stem-and-leaf plot to compare the ages of his students.

Ages of students attending Barry's Ballroom Dancing Studio

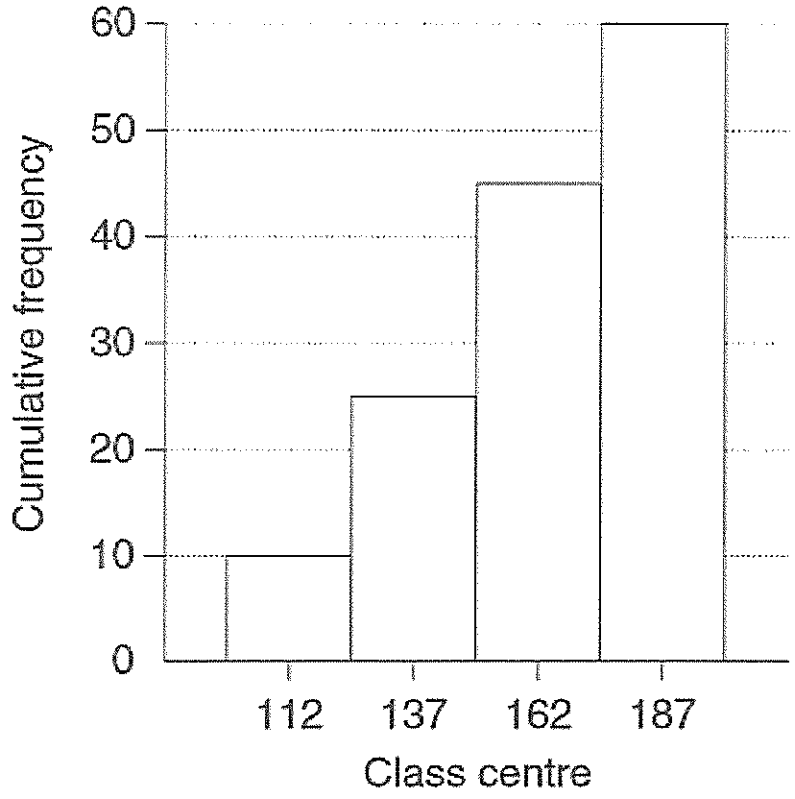
Females		*Males*
9	1	1 2 3
7	2	0 2 2 2 4 5
5	3	0 0 1 7
5 2	4	6 7
3 2 0	5	2
4 4 2 1	6	4 4

a) Overall, which age is most common among Barry's students? **1**

b) Where are the data clustered for *Females* and for *Males*? **2**

c) Based on clustering, compare the distribution of the age of the male and female students. **1**

Q 8) Corey recorded the heights (in centimetres) of a random sample of students in his school. The cumulative frequency graph displays the results.



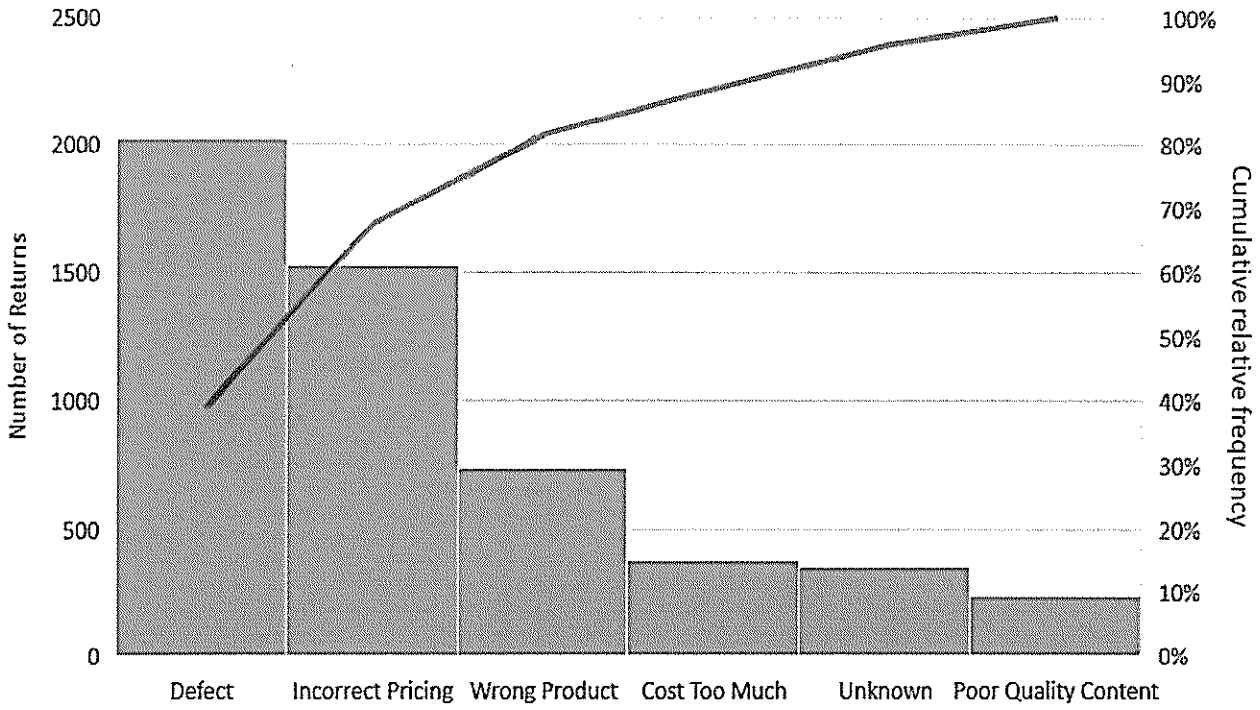
a) On the graph, draw the cumulative frequency polygon (ogive). **1**

b) Approximately how many of the students surveyed have a height that is in the class interval with centre 137? **1**

c) What is the class interval with centre 137? **2**

d) In order to select the sample, Corey's friend suggested selecting the first 60 students to arrive at the basketball courts at lunch time. Explain why this would be a biased sample. **1**

Q 9) The reasons for customers returning their purchased items to a retail store was recorded and is shown in the Pareto chart below. **1**



Which reason(s) account for 80% of the returns?

A Defect

B Wrong Product

C Defect, Incorrect Pricing and Wrong Product

D Incorrect Pricing, Unknown, and Poor Quality Content

Section B: Formulae and Equations

Mark

Q 1) What is the value of $\frac{a-b}{4}$ if $a = 120$ and $b = -12$. **1**

A 18 **B** 27 **C** 33 **D** 42

Q 2) The closest value of m given $m^2 = u^2 - 2gh$ and $u = 9, g = 7.2$ and $h = 3$. **1**

A 6.1 **B** 11.1 **C** 37.8 **D** 123.2

Q 3) Solve each of the following equations.

a) $4x - 6 = 18$ **1**

b) $3x + 2(x - 4) = -21$ **2**

c) $\frac{5x-1}{2} = 4x - 8$ **2**

Q 4) The number of red pens (R) and the number of blue pens (B) produced by a factory in a particular month followed the linear equation: $R = 2B$ **1**

In terms of the number of each type of pen produced, explain what the equation means.

Q 5) Make b the subject of the equation $a = \sqrt{7b + 3}$. **2**

Q 6) Ella is driving at 70 km/h. She notices a branch on the road 75 metres ahead and decides to apply the brakes.

(a) Calculate Ella's reaction-time distance if her reaction time is 1.5 seconds. Answer to the nearest metre. **1**

(b) Ella's braking distance (D metres) is given by $D = 0.01v^2$, where v is the speed in km/h. What is her stopping distance? **2**

(c) Will Ella's car hit the branch? Justify your answer with calculations. **1**

Q 7) The formula $T = \frac{BAC}{0.015}$ estimates the time T (in hours) to wait until a person's Blood Alcohol Content (BAC) reaches zero. **2**

After drinking at a party, Minh's BAC reaches 0.05. If Minh stops drinking, how long, in hours and minutes, must he wait until his BAC reaches zero?

Q 8) The following formula can be used to estimate the BAC of a male, **3**

$$BAC = \frac{10N - 7.5H}{6.8M}$$

Where N is the number of standard drinks consumed, H is the number of hours of drinking, and M is the person's weight in kilograms.

Robert weighs 90 kg, and is drinking low alcohol beer at a party over a five-hour period. He reads on the label of the low alcohol beer bottle that it is equivalent to 0.8 of a standard drink.

What is the maximum number of complete bottles of the low alcohol beer that he can drink to remain under a BAC of 0.05?

Q 9) The formula below can be used to calculate the required dosages of medicine for children aged 1 – 2 years old. **3**

$$D = \frac{mA}{150}$$

Where D is the dosage for children aged 1 – 2 years, m is the age of child (in months), and A is the adult dosage.

How much medicine should be given in total to a one-and-a-half year old child between 8 am and 11 pm if each adult dosage is 300 mL? The medicine is to be taken every 6 hours with the first dose given at 7 am.

Carlingford High School

Year 11 Standard Mathematics

Term 1 Assessment Task 2019

Time allowed: 50 minutes

Name: Sample Solutions + Marking Criteria

Circle your teacher's name:

Mrs Lobejko Mrs Lego Mr Fardouly Miss Aung

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Section A: Classifying and Representing Data

Mark

Q 1) A study on the driving habits of NSW Learner License holders is to be conducted. Data is to be collected using a questionnaire.

a) One question that will be asked is: **1**

"How often do you listen to music while driving? (circle one) Always Sometimes Never"

The data collected by this question would be classified as:

A Categorical, nominal

B Categorical, ordinal

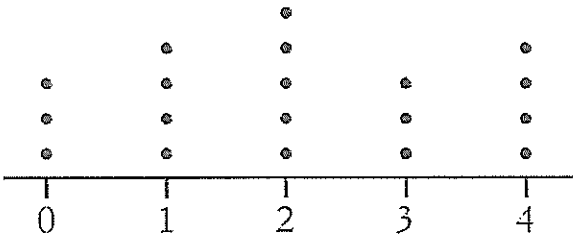
C Quantitative, discrete

D Quantitative, continuous

b) Who would be surveyed if it is decided to use a census for the study? **1**

Every NSW Learner License holder ✓

Q 2) Police Officer Smith conducted Random Breath Testing (RBT) on a particular day. For each car that Officer Smith stopped for RBT, the number of passengers in the car was noted. The results are shown in the dot plot below.



a) How many cars did Officer Smith stop for RBT? **1**

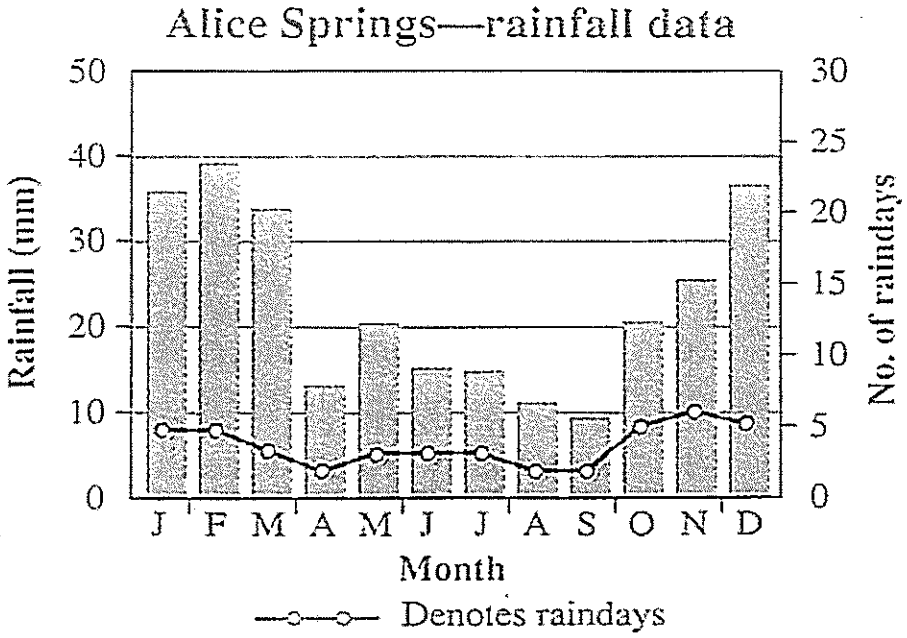
19 ✓

b) What percentage of the cars stopped had at least 3 passengers? Answer to the nearest percent. **1**

$\frac{7}{19} \times 100 = 36.842...\%$ } accept either

$= 37\%$ ✓

Q 3) This graph from the Bureau of Meteorology gives rainfall information for Alice Springs.



a) Approximately how much rainfall was there in May? **1**

≈ 20.5 mm ✓ (accept within 20-21)

b) Considering both the rainfall and number of raindays, in which month would most people travel to Alice Springs? **1**

September ✓

Q 4) The student enrolment at Achievement High School is shown in the table.

Year	7	8	9	10	11	12	Total
Number of Students	225	232	233	230	150	130	1200

Jason wants to survey 180 students from the school. If he wishes to use a stratified sample based on year groups, how many students from Year 8 should be surveyed? **2**

$\frac{232}{1200} \times 180 = 34.8$ ✓

∴ Jason should survey 35 ✓ students from Year 8.

Q 5) A factory produces 140 refrigerators in a day.

a) At what interval should refrigerators be selected for a quality check if a systematic sample of 7 refrigerators is required each day? **1**

$140 \div 7 = 20$ ✓

$\therefore$ check every 20th refrigerator.

b) Using your result from part (a), if the first refrigerator selected is number 22, write the number, in order, of each refrigerator that would be selected for the sample. **2**

22, 42, 62, 82, 102, 122, 2

deduct 1 mark for each mistake

Q 6) An incomplete grouped data frequency distribution table is shown.

Class interval	*Class centre*	*Frequency*
0 – 14	7	
15 – 29		9
30 – 44	37	24

a) Find the class centre for the class interval 15 – 29. **1**

Class centre $= \frac{15+29}{2} = 22$ ✓

b) The relative frequency of the class interval 30 – 44 was found to be $\frac{8}{17}$. **2**

Find the frequency of the class interval 0 – 14.

$\frac{8}{17} \overset{\times 3}{=} \frac{24}{51}$ $\therefore$ total frequency is 51 ✓

$51 - 24 - 9 = 18$

$\therefore$ frequency of class interval 30–44 is 18 ✓

Q 7) Barry constructed an ordered back-to-back stem-and-leaf plot to compare the ages of his students.

Ages of students attending Barry's Ballroom Dancing Studio

Females		*Males*
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5	3	0 0 1 7
5 2	4	6 7
3 2 0	5	2
4 4 2 1	6	4 4

a) Overall, which age is most common among Barry's students? **1**

64 ✓

b) Where are the data clustered for *Females* and for *Males*? **2**

Females : in the 50s and 60s ✓

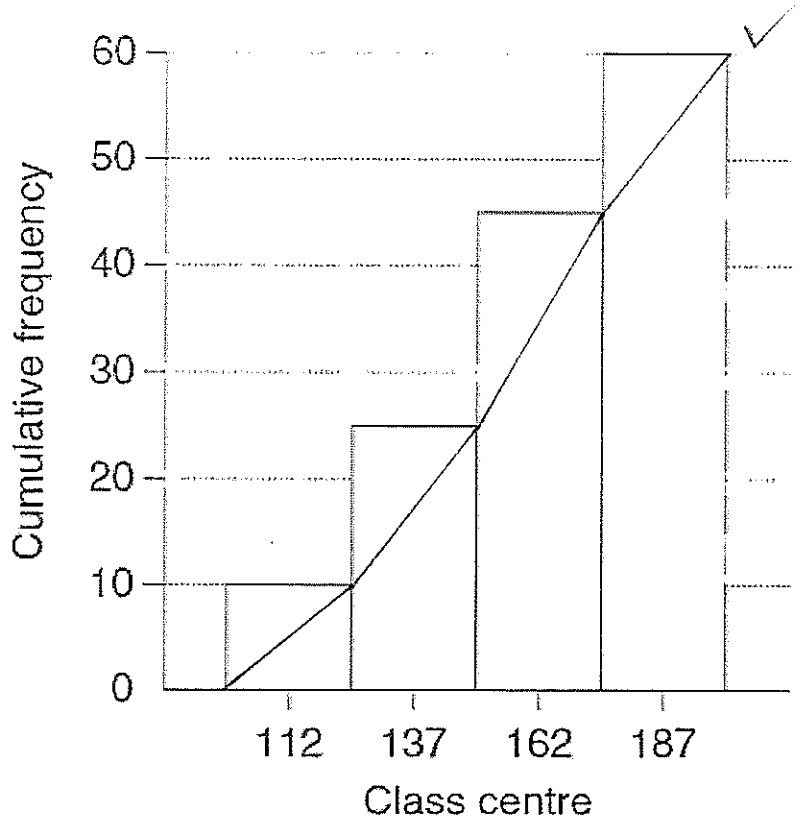
Males : in the 20s and 30s ✓

c) Based on clustering, compare the distribution of the age of the male and female students. **1**

The male students tend to be younger than the female students.

✓

Q 8) Corey recorded the heights (in centimetres) of a random sample of students in his school. The cumulative frequency graph displays the results.



a) On the graph, draw the cumulative frequency polygon (ogive). **1**

b) Approximately how many of the students surveyed have a height that is in the class interval with centre 137? **1**

$25 - 10 = 15$ ✓

c) What is the class interval with centre 137? **2**

$\frac{137-112}{2} = 12.5$ ✓ or equivalent working

so $137 - 12 = 125$ and $137 + 12 = 149$

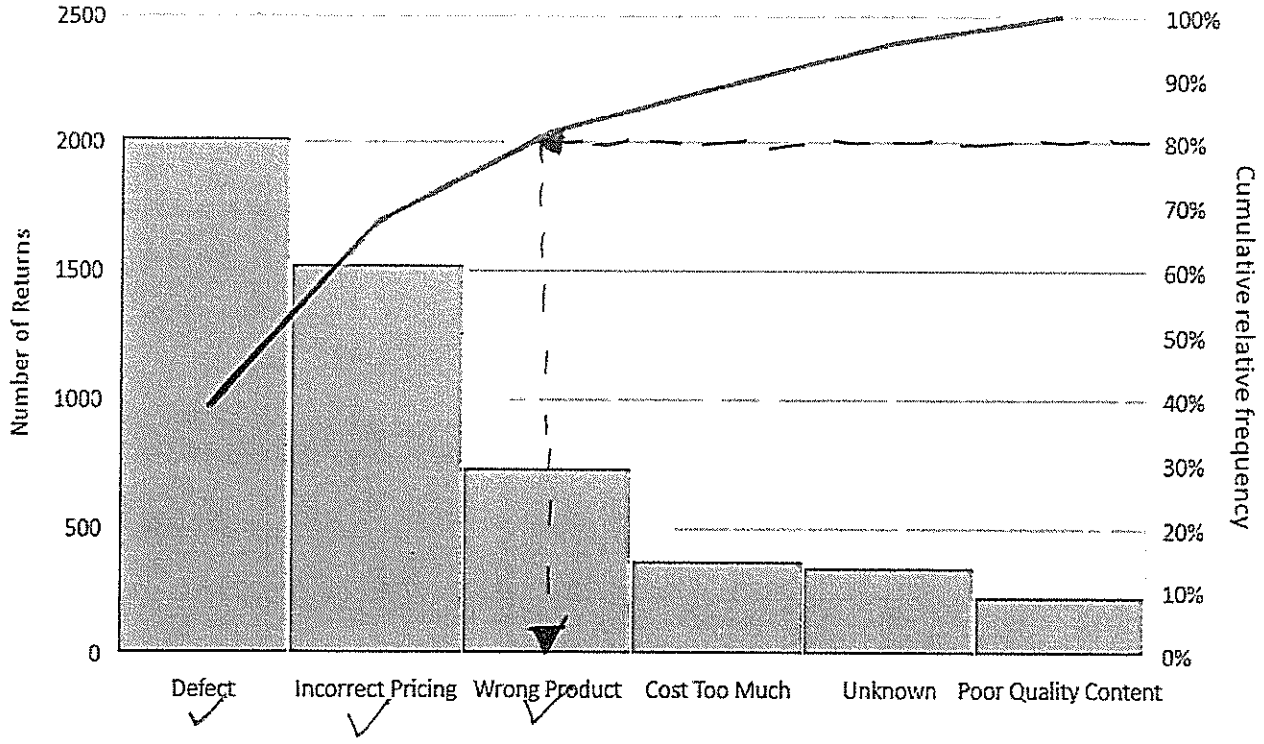
$\therefore$ class interval = $125 - 149$ ✓ (accept $124.5 - 149.5$)

d) In order to select the sample, Corey's friend suggested selecting the first 60 students to arrive at the basketball courts at lunch time. Explain why this would be a biased sample. **1**

Students who play basketball tend to be taller ✓

(There must be reference to "height")

Q 9) The reasons for customers returning their purchased items to a retail store was recorded and is shown in the Pareto chart below. **1**



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Q 1) What is the value of $\frac{a-b}{4}$ if $a = 120$ and $b = -12$. **1**

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(A) 6.1 B 11.1 C 37.8 D 123.2

Q 3) Solve each of the following equations.

a) $4x - 6 = 18$ **1**

$4x = 24$

$x = 6$ ✓

b) $3x + 2(x - 4) = -21$ **2**

$3x + 2x - 8 = -21$ ✓

$5x - 8 = -21$

$5x = -13$

$x = -13/5$ ✓ (or -2.6 or $-2\frac{3}{5}$)

c) $\frac{5x-1}{2} = 4x - 8$ **2**

$5x - 1 = 8x - 16$ ✓

$16 - 1 = 8x - 5x$

$15 = 3x$

$x = 15/3$

$x = 5$ ✓

Q 4) The number of red pens (R) and the number of blue pens (B) produced by a factory in a particular month followed the linear equation: $R = 2B$ **1**

In terms of the number of each type of pen produced, explain what the equation means.

The number of red pens produced was twice the number of blue pens produced. ✓

Q 5) Make b the subject of the equation $a = \sqrt{7b + 3}$. **2**

$a^2 = 7b + 3$ ✓

$a^2 - 3 = 7b$

$b = \frac{a^2 - 3}{7}$ ✓

Q 6) Ella is driving at 70 km/h. She notices a branch on the road 75 metres ahead and decides to apply the brakes.

(a) Calculate Ella's reaction-time distance if her reaction time is 1.5 seconds. Answer to the nearest metre. **1**

Reaction-time distance : $\frac{70 \times 1000}{60 \times 60} \times 1.5 = 29.16$ metre

$= 29$ metres ✓

(b) Ella's braking distance (D metres) is given by $D = 0.01v^2$, where v is the speed in km/h. What is her stopping distance? **2**

Braking distance : $D = 0.01 \times 70^2$

$= 49$ metres ✓

Stopping distance $= 29 + 49$

$= 78$ metres. ✓

(c) Will Ella's car hit the branch? Justify your answer with calculations. **1**

Yes. Ella's car will stop $78 - 75 = 3$ metres after ✓ the branch on the road.

Q 7) The formula $T = \frac{BAC}{0.015}$ estimates the time T (in hours) to wait until a person's Blood Alcohol Content (BAC) reaches zero. **2**

After drinking at a party, Minh's BAC reaches 0.05. If Minh stops drinking, how long, in hours and minutes, must he wait until his BAC reaches zero?

$T = \frac{0.05}{0.015}$

$= 3.\dot{3}$ hours ✓

$= 3$ hours 20 mins. ✓

Q 8) The following formula can be used to estimate the BAC of a male, **3**

$$BAC = \frac{10N - 7.5H}{6.8M}$$

Where N is the number of standard drinks consumed, H is the number of hours of drinking, and M is the person's weight in kilograms.

Robert weighs 90 kg, and is drinking low alcohol beer at a party over a five-hour period. He reads on the label of the low alcohol beer bottle that it is equivalent to 0.8 of a standard drink.

What is the maximum number of complete bottles of the low alcohol beer that he can drink to remain under a BAC of 0.05?

$0.05 = \frac{10N - 7.5(5)}{6.8 \times 90}$

$0.05 = \frac{10N - 37.5}{612}$

$30.6 = 10N - 37.5$

$68.1 = 10N$

$N = 6.81$ ✓

# of bottles $= \frac{6.81}{0.8}$ ✓

$= 8.5125$ ✓ ∴ He can have at most 8 ✓ bottles of that beer.

Q 9) The formula below can be used to calculate the required dosages of medicine for children aged 1 – 2 years old. **3**

$$D = \frac{mA}{150}$$

Where D is the dosage for children aged 1 – 2 years, m is the age of child (in months), and A is the adult dosage.

How much medicine should be given in total to a one-and-a-half year old child between 8 am and 11 pm if each adult dosage is 300 mL? The medicine is to be taken every 6 hours with the first dose given at 7 am.

$D = \frac{18 \times 300}{150}$

$= 36$ mL each dose. ✓

Between 8am-11pm, there are 2 ✓ doses (at 1pm and 7pm)

∴ total amount of medicine between 8am-11pm $= 2 \times 36$mL

$= 72$ mL ✓