

| Time (minutes) | Number of students |
|------------------|--------------------|
| $0 \leq t < 10$ | 5 |
| $10 \leq t < 20$ | |
| $20 \leq t < 30$ | 20 |
| $30 \leq t < 40$ | 24 |
| $40 \leq t < 50$ | |
| $50 \leq t < 60$ | 6 |

This is a cumulative frequency diagram for the time t , in minutes, taken by 80 students to complete a task.

- (a) Complete the frequency table to the right of the chart. [2 marks]
- (b) Write down the median time to complete the task. _____ [2 marks]
- (c) The middle 50% of time results lie between minutes a and b , where $a < b$.
Find a and b .
 $a =$ _____ $b =$ _____ [2 marks]
- (d) Find the percent of students who took 50 minutes or longer to finish the task _____ [2 marks]
- (e) Draw a box-and-whisker plot below by utilizing the information from the cum. freq. diag. [2 marks]

2.)

The Brahma chicken produces eggs with weights in grams that are normally distributed about a mean of 55 g with a standard deviation of 7 g. The eggs are classified as small, medium, large or extra large according to their weight, as shown in the table below.

| Size | Weight (g) |
|-------------|------------------------------|
| Small | Weight < 53 |
| Medium | $53 \leq \text{Weight} < 63$ |
| Large | $63 \leq \text{Weight} < 73$ |
| Extra Large | Weight ≥ 73 |

- (a) Sketch a diagram of the distribution of the weight of Brahma chicken eggs. On your diagram, show clearly the boundaries for the classification of the eggs. [3 marks]

An egg is chosen at random.

- (b) Find the probability that the egg is

(i) medium;

(ii) extra large.

[4 marks]

There is a probability of 0.3 that a randomly chosen egg weighs more than w grams. [2 marks]

- (c) Find w .

[2 marks]

The probability that a Brahma chicken produces a large size egg is 0.121. Frank's Brahma chickens produce 2000 eggs each month.

- (d) Calculate an estimate of the number of large size eggs produced by Frank's chickens each month.

[2 marks]

The selling price, in US dollars (USD), of each size is shown in the table below.

| Size | Selling price (USD) |
|-------------|---------------------|
| Small | 0.30 |
| Medium | 0.50 |
| Large | 0.65 |
| Extra Large | 0.80 |

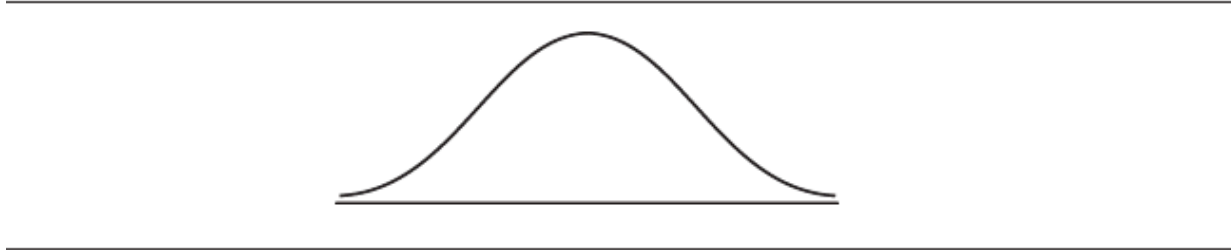
The probability that a Brahma chicken produces a small size egg is 0.388.

- (e) Estimate the monthly income, in USD, earned by selling the 2000 eggs. Give your answer correct to two decimal places.

[Maximum mark: 6]

3.) Let X be normally distributed with mean 100 cm and standard deviation 5 cm.

(a) On the diagram below, shade the region representing $P(X > 105)$. [2 marks]



(b) Given that $P(X < d) = P(X > 105)$, find the value of d . [2 marks]

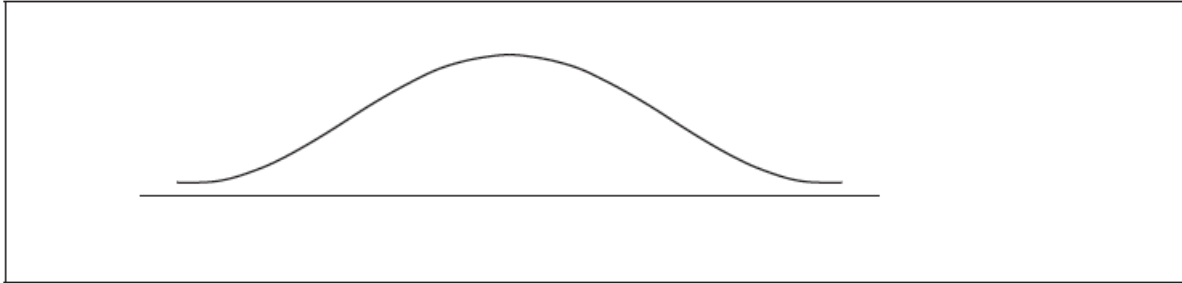
(c) Given that $P(X > 105) = 0.16$ (correct to two significant figures), find $P(d < X < 105)$. [2 marks]

5.) The weight of bags of chips is normally distributed with mean μ and standard deviation σ . 10% of bags weigh greater than 750g, and 22% of bags weigh less than 250g. Find μ and σ . [4 marks]

6.) [Maximum mark: 6]

A random variable X is distributed normally with mean 450. It is known that $P(X > a) = 0.27$.

(a) Represent all this information on the following diagram. [3 marks]



(b) Given that the standard deviation is 20, find a . Give your answer correct to the nearest whole number. [3 marks]

7.) Katie analyzes global temperature data and finds a mean of 23.4°C and a standard deviation of 3.21°C .

- a) Katie adds 1.21°C to each of her data points to analyze what this would do to global ice melt rates. Describe how this transformation affects the mean and standard deviation.
- b) Katie multiplies each of her data points by 1.5°C to analyze the number of species that would become extinct by the change. Describe how this transformation affects the μ and σ .

Answer key (ensure you show calculations to receive full marks)

1.) tutorials; part e: the whiskers will be the lowest and highest times to complete the task while the inner box will be comprised of the Q1, Median, and Q3

2.) a.) Ensure your diagram has the mean, standard deviation, and each size category marked.

b.) i. 48.6% ii. 0.506%

c.) 58.7g

d.) 242 eggs

e.) \$884.20

3.) Shade the area past one standard deviation to the right; 95; 0.68

5.) $\mu = 438\text{g}$; $\sigma = 243\text{g}$

6.) $a = 462$

7.) μ increases by 1.21 to 24.61°C ; σ remains 3.12°C

μ increases by a factor of 1.21 to 35.1°C ; σ also increases by a factor of 1.5 to 4.82°C

Simply putting these answers will not ensure credit. You need to explain why certain transformations affect μ and why others affect σ .