TB(2A) Ch. 4 Approximation & Errors
Conventional Questions

1.   **[11-12 Mid-year Exam #7]**
The actual width of Joseph's room is x m.
(a)   If the length of his room is less than 2 times its width by 5 m and the ratio of its length to its width is $3:2$, find the value of x.   **(2 marks)**
(b)   The ratio of the area of his room to the area of his appartment is $1:3$. If the actual width of his appartment is 18 m, find the actual length of his appartment.   **(2 marks)**
(c)   Joseph would like to draw a floor plan of his appartment in the scale of $1:150$. Find the length of his appartment in the scale drawing. Give your answer correct to the nearest 0.01 cm.   **(2 marks)**

2.   **[11-12 Mid-year Exam #10]**
In the District Council Election 2011, the number of registered voters in Wong Tai Sin District is reported to be 29000, correct to 3 significant figures.
(a)   **(i)**   Find the maximum absolute error and the lower limit of the number of registered voters. **(1 mark)**
(ii)   Find the percentage error of the number of registered voters.   **(2 marks)**
(b)   Exactly 38% of the registered voters voted in the election. Find the minimum possible number of registered voters that voted.   **(2 marks)**

3.   **[11-12 Mid-year Exam #11]**
In **Figure 1**, polygon *ABCDEF* is formed by cutting off a rectangle *CDEG* from a square *ABGF*. The length of *AB, CD* and *DE* are 10.0 cm, 2.5 cm and 1.0 cm respectively, correct to 1 decimal place.
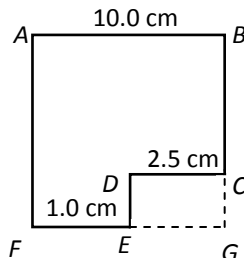

Figure 1

(a)   Find the lower and upper limits of the actual area of the polygon *ABCDEF*.   **(4 marks)**
(b)   Find the accumulated error of the area of the polygon *ABCDEF*.   **(3 marks)**

4.   **[11-12 Final Exam #2]**
Amy, Betty, Cat and Denise have $26.8, $32.3, $42.5 and $56.9 respectively.
(a)   By rounding down the amount owned by each girl to the nearest dollar, estimate the total amount they have.   **(2 marks)**
(b)   If the four girls want to buy a gift of price $155, will they have enough money to buy the gift? Use the result of **(a)** to explain your answer.   **(1 mark)**

5.   [12-13 S6 Mock Exam #9]
Simon uses a measuring tape and a set of bathroom scales as shown in **Figures 3a** and **3b** respectively to measure his height and weight in order to find out his Body Mass Index (BMI).

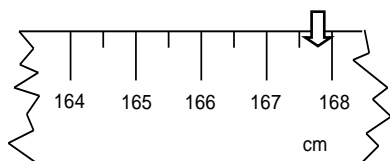

Figure 3a   Figure 3b
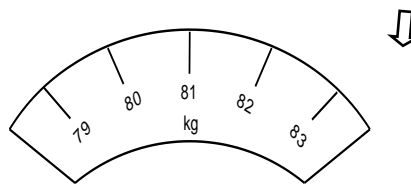
(a)   (i) Write down the measured values of the height and the weight of Simon.
(ii)   Find the maximum absolute errors of the measuring tape and the bathroom scales.

(2 marks)

(b) It is known that the formula to calculate BMI is

$$\text{BMI} = \frac{\text{weight in kg}}{(\text{height in m})^2}$$

(i)   Find Simon's maximum BMI.
(ii)   Find the percentage error of Simon's BMI.

(4 marks)

6.   [12-13 S.2 Final Exam #9]
In a protest against the low wage situation of dock workers, the Labour Party claimed that there were 4000 protesters, while the police claimed that there were only 2800 protesters.
(a) If the number of protesters estimated by the Labour Party was rounded off to the nearest thousand, find the relative error of the estimation.   **(2 marks)**
(b) If the estimation made by the police had a percentage error of 30%, find the maximun absolute error.   **(2 marks)**
(c) What is the possible range of the actual number of protesters that fulfills both of the claims made by the Labour Party and the police?   **(1 mark)**

7.   [12-13 S.2 Mid-year Exam #11]
In a speed Test, the speed of a car is measured to be 110 km/h, correct to 2 significant figures.
(a)   Find the maximum absolute error of the measurement.   **(1 mark)**
(b)   Find the relative error of the measured speed.   **(2 marks)**
(c) (i)   Find the range of the actual speed of the car.   **(2 marks)**
(ii)   Lilian claims that the speed of the car can be 104 km/h. Do you agree?   Explain briefly.   **(1 mark)**
(d)   Find the shorTest time for the car to travel a distance of 230 km.   **(2 marks)**

8.   [13-14 S.2 Mid-year Exam #11]
Figure 2 is a Test Report which shows the exact marks for the Chinese, English and Maths tests that Amy Chan took last month.   However, part of the report was torn.   Amy only remembers that her total marks are 230 correct to the nearest 10.
(a) Find the lower limits of her
(i)   total marks;   **(1 mark)**
(ii) Maths marks.   **(2 marks)**
(b) Amy estimates that her Maths marks should be the lower limit found in **(a)(ii)**.   After checking, her actual mark is 85.   Find the relative error of her estimation of her Maths marks.   **(2 marks)**

Test Report

Name: Amy Chan
Subject   Marks
Chinese   75
English   68
Maths

Figure 2

9. **[13-14 S.2 Mid-year Exam #14]**
    To lay a new railway track, it is estimated to use 100 identical steel bars with an absolute error of 2 bars.   The measured length of each steel bar is 12.5 m with a maximum absolute error of 1 cm.   Find the range of the total true length (in m) of the railway track.   **(3 marks)**

10. **[13-14 S.2 Final Exam #9]**
    The time required to travel from Choi Hung to Yau Tong by MTR is 12 min, correct to the nearest 2 min.
    (a) Find the maximum absolute error of the estimated time.   **(1 mark)**
    (b) Find the percentage error of the estimated time.   **(2 marks)**
    (c) Zoe entered a train at Choi Hung MTR station at 5:59 p.m. and she claimed to her mother that she should be able to arrive at Yau Tong MTR station at 6:10 p.m.   Do you agree with her claim?   Explain your answer.   **(2 marks)**

11. **[13-14 S.6 Mock Exam #1]**
    Amy goes on a holiday trip. The weight of her luggage is measured to be 22.5 kg, correct to the nearest 0.5 kg. Find the percentage error of the measurement.   **(2 marks)**

12. **[14-15 S.2 Mid-Year Exam #4]**
    Stephanie takes 62.5 seconds to complete 1 lap of round-the-campus run. It is given that the maximum absolute error of the measurement is 0.25 second.
    (a)   Find the relative error of the measured time.   **(2 marks)**
    (b)   Write down the upper limit of Stephanie's finishing time.   **(1 mark)**
    (c)   Write down the scale interval of the measuring tool used.   **(1 mark)**

13. **[14-15 S.2 Mid-Year Exam #10]**
    There are about 46 400 articles, correct to 3 significant figures, in a whole set of encyclopedia.
    (a)   Find the percentage error of the above estimation.   **(2 marks)**
    (b)   There are about 590 words, correct to the nearest 10, in each article on average. Is it possible that there are 28 million words in the whole set of encyclopedia? Explain your answer.   **(2 marks)**

14. **[14-15 S.6 Mock Exam #4]**
    The length, width and height of a cuboid are measured as 13.8 cm, 6.2 cm and 7.4 cm respectively, correct to the nearest 0.2 cm.
    (a)   Find the percentage error of the measured height.
    (b)   By rounding up all the measurements to the nearest cm, estimate the volume of the cuboid.

15. **[14-15 S.2 Final Exam #3]**
    The depth of the water in a swimming pool is measured to be 1.8 m, correct to the nearest 0.1 m.
    (a) Find the maximum absolute error of the measurement.   **(1 mark)**
    (b) Find the percentage error of the measurement.   **(2 marks)**

16.   [14-15 S.2 Mid-year #4]

A box of sugar weighed 5 kg, correct to the nearest 0.05 kg. Find

(a)   the maximum absolute error,   **(1 mark)**

(b)   the relative error,   **(1 mark)**

(c)   the percentage error.   **(1 mark)**

17.   [15-16 S.2 Mid-year #12]

There is a production rule in VT juice manufacturer on the box capacity. For a box of 250 mL juice, the percentage error of the capacity cannot exceed 1%. Find the range of the capacity of a box of 250 mL juice produced by this manufacturer.   **(3 marks)**

18.   [15-16 S.2 Final Exam, #11]

George measured the weight of an orange and the result was 200 g correct to the nearest x g. If the percentage error was 2.5%, find x.   **(2 marks)**

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