1 Estimation

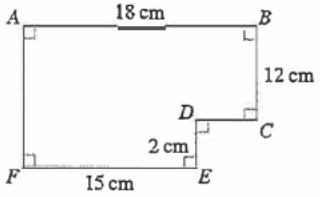
1.1 HKCEE MA 2006 – I – 11

In the figure, *ABCDEF* is a thin six-sided polygonal metal sheet, where all the measurements are correct to the nearest cm.

(a) Write down the maximum absolute error of the measurements.

(b) Find the least possible area of the metal sheet.

(c) The actual area of the metal sheet is x cm^2. Find the range of values of x.



1.2 HKCEE MA 2007 I 10

(a) If the length of a piece of thin metal wire is measured as 5 cm correct to the nearest cm, find the least possible length of the metal wire.

(b) The length of a piece of thin metal wire is measured as 2.0 m correct to the nearest 0.1 m.

(i) Is it possible that the actual length of this metal wire exceeds 206 cm? Explain your answer.

(ii) Is it possible to cut this metal wire into 46 pieces of shorter metal wires, with each length measured as 5 cm correct to the nearest cm? Explain your answer.

1.3 HKCEE MA 2008 – I – 7

John wants to buy the following items in a supermarket:

Item	Unit price	Quantity needed
Biscuit	\$8.2 per pack	4 packs
Chocolate	\$16.3 per box	3 boxes
Soft drink	\$4.8 per can	2 cans

(a) By rounding up the unit price of each item to the nearest dollar, estimate the total amount that John should pay.

(b) If John has only \$100, does he have enough money to buy all the items needed? Use the result of (a) to explain your answer.

1.4 HKCEE MA 2009 – I – 4

Round off 405.504 to

(a) the nearest integer,

(b) 2 decimal places,

(c) 2 significant figures.

1.5 HKCEE MA 2010 I 8

Three students, Peter, John and Henry have \$16.8, \$24.3 and \$32.5 respectively.

(a) By rounding down the amount owned by each student to the nearest dollar, estimate the total amount they have.

(b) If the three students want to buy a football of price \$70, will they have enough money to buy the football? Use the result of (a) to explain your answer.

1.6 HKCEE MA 2011 – I – 4

(a) Round off 8 091.1908 to the nearest ten.

(b) Round up 8 091.1908 to 3 significant figures.

(c) Round down 8 091.1908 to 3 decimal places.

1.7 HKDSE MA 2013 – I – 8

A pack of sea salt is termed *regular* if its weight is measured as 100 g correct to the nearest g.

(a) Find the least possible weight of a *regular* pack of sea salt.

(b) Is it possible that the total weight of 32 *regular* packs of sea salt is measured as 3.1 kg correct to the nearest 0.1 kg? Explain your answer.

1.8 HKDSE MA 2014 – I – 3

(a) Round up 123.45 to 1 significant figure.

(b) Round off 123.45 to the nearest integer.

(c) Round down 123.45 to 1 decimal place.

1.9 HKDSE MA 2017 – I 9

A bottle is termed *standard* if its capacity is measured as 200 mL correct to the nearest 10 mL.

(a) Find the least possible capacity of a *standard* bottle.

(b) Someone claims that the total capacity of 120 *standard* bottles can be measured as 23.3 L correct to the nearest 0.1 L. Do you agree? Explain your answer.

1.10 HKDSE MA 2018 – I – 3

(a) Round up 265.473 to the nearest integer.

(b) Round down 265.473 to 1 decimal place.

(c) Round off 265.473 to 2 significant figures.

1.11 HKDSE MA 2020 – I – 3

(a) Round up 534.7698 to the nearest hundred.

(b) Round down 534.7698 to 2 decimal places.

(c) Round off 534.7698 to 2 significant figures.

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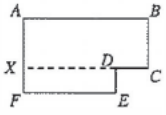
1 Estimation

1.1 HKCEE MA 2006 – I – 11

(a) Maximum absolute error = 1 cm ÷ 2 = 0.5 cm

(b) Least possible area of $ABCX = 17.5 \times 11.5 = 201.25\ cm^2$
Least possible area of $DEFX = 1.5 \times 15.5 = 23.25\ cm^2$
∴ Least possible area of sheet $= 224.5\ cm^2$

(c) Upper limit of area $= 18.5 \times 12.5 + 2.5 \times 16.5 = 272.5\ cm^2$
∴ $224.5 \leq x < 272.5$



1.2 HKCEE MA 2007 – I – 10

(a) Least possible length = 5 – 1 ÷ 2 = 4.5 (cm)

(b) (i) Upper limit = (2.0 + 0.1 ÷ 2) m = 205 cm < 206 cm
∴ No.

(ii) *Method 1*
Least possible total length of short wires
4.5 cm × 46 = 207 cm > 205 cm
∴ No.

Method 2
Upper limit of length of one short wire
= 205 cm ÷ 46 = 4.4565 cm < 4.5 cm
∴ No.

1.3 HKCEE MA 2008 – I – 7

(a) Total amount ≈ $(9 × 4 + 17 × 3 + 5 × 2) = $97

(b) ∵ Actual amount < Estimated amount < $100
∴ Yes.

1.4 HKCEE MA 2009 – I – 4

(a) 406

(b) 405.50

(c) 410

1.5 HKCEE MA 2010 – I – 8

(a) Total amount ≈ $(16 + 24 + 32) = $72

(b) ∵ Actual amount > Estimated amount > $70
Yes.

1.6 HKCEE MA 2011 – I – 4

(a) 8090

(b) 8100

(c) 8091.190

1.7 HKDSE MA 2013 – I – 8

(a) Least possible weight = $(100 - 1 \div 2)g = 99.5$ g

(b) *Method 1*
Least possible total weight = 99.5 g × 32
= 3184 g = 3.2 kg, nearest 0.1 kg
∴ No.

Method 2
Upper limit of weight of 1 pack $= \frac{3.1 + 0.1 \div 2}{32}$ kg
$= 98.43\text{g} < 99.5\text{g}$
∴ No.

1.8 HKDSE MA 2014 – I – 3

(a) 100

(b) 123

(c) 123.4

1.9 HKDSE MA 2017 – I – 9

(a) Least possible capacity = (200 10 ÷ 5) mL = 195 mL

(b) *Method 1*
Least total capacity = 195 mL × 120 = 23.4 L > 23.35 L
∴ No.

Method 2
Upper limit of capacity of 1 bottle $= \frac{23.3 + 0.1 \div 2}{120}$ L
$= 194.58\text{mL} < 195$ mL
. No.

1.10 HKDSE MA 2018 – I – 3

(a) 266

(b) 265.4

(c) 270

1.11 HKDSE MA 2020 – I – 3

3a	600
b	534.76
c	530

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