

Section I — Multiple choice

1 A mobile phone plan has a monthly charge of \$39 on a 24-month contract. The call rate is \$0.92 per 60 second block plus there is a \$0.28 flagfall. What is the cost of making a five-minute call?

- A \$1.20 B \$4.60 C \$4.88 D \$6.00
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2 Toby has a mobile phone contract that charges a monthly access fee of \$29, free calls \$100, flagfall \$0.25 and call rate of \$0.40 per 30 second. What the monthly charge if Toby made 250 calls whose duration was less than 30 seconds?

- A \$29.00 B \$91.50 C \$162.50 D \$191.50
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3 How many kilobits per second are there in 7 000 megabits per second?

- A 0.007 B 7 C 7 000 000 D 7 000 000 000
-

4 How many files of average size 1.8 MB can be stored on a 16 GB USB drive?

- A 8 B 115 C 9102 D 9 320 676
-

5 How many terabytes are there in 4 194 304 gigabytes?

- A 0.0039 B 4 C 4096 D 4 294 967 296
-

6 Which is the largest file size?

- A 500 MB B 500 000 B C 5000 KB D 0.005 TB
-

7 The file size (in MB) and the number of files on a USB drive is shown in the table opposite. What is the mean file size?

- A 0.87 B 4.00
C 4.11 D 5.00

File size	Frequency
3	12
4	8
5	16

8 What is the median file size using the table in question 7?

- A 0.87 B 4.00 C 4.11 D 5.00
-

Section II — Short answer

1 The table below shows three mobile phone plans.

	Simple	Regular	Super
Monthly Access Fee	19.00	39.00	59.00
Free calls	\$100.00	\$200.00	\$300.00
Connection fee – Flagfall	0.35	0.30	0.25
Call Rates (per 30 sec)	0.40	0.30	0.20

a What is the charge for a call lasting 4 minutes and 30 seconds on the Regular plan?

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b Determine the monthly charge for making 500 calls (30 seconds) on the Super plan.

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c Lara is deciding on one of the above mobile phone plans. She will be using her mobile phone to make 300 calls (30 seconds) each month. What plan should she choose?

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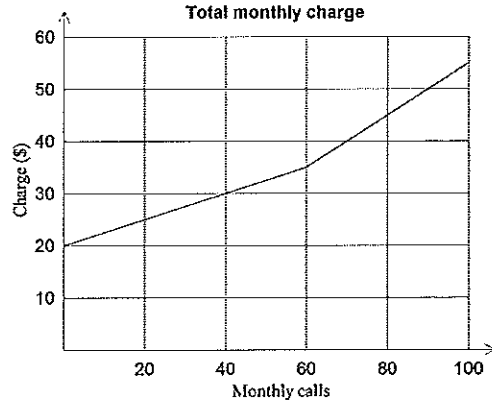
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2 A mobile phone plan has a monthly service fee plus call costs whose rate changes after 60 calls.

a How much is the monthly service fee?

b How much does the company charge if you make 80 calls a month?

c How many calls are made if the total monthly charge is \$30?



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3 Complete the following.

a \square B = 8 GB

b 12 TB = \square MB

c \square TB = 9216 GB

d 0.5 TB = \square GB

e 5 Tbps = \square Gbps

f 1 Kbps = \square bps

g 3 200 000 000 bps = \square Gbps

h 4 000 000 Kbps = \square Gbps

Topic Test 13 Mathematics and communication

Worked solutions

Section 1	Solution	Answer															
1	$\text{Charge} = 0.28 + (300 \div 60) \times 0.92$ $= \$4.88$	C															
2	$\text{Charge} = 250 \times [0.25 + 0.40]$ $= \$162.50$ $\text{Monthly cost} = \$29 + \$162.50 - \$100$ $= \$91.50$	B															
3	$7000 \text{ Mbps} = 7000 \times 1000 \text{ Kbps}$ $= 7\,000\,000 \text{ Kbps}$	C															
4	$16 \text{ GB} = 16 \times 2^{10} \text{ MB}$ $= 16\,384 \text{ MB}$ $\text{Number of files} = \frac{16\,384}{1.8}$ $= 9102.222\dots$ ≈ 9102	C															
5	$4\,194\,304 \text{ GB} = 4\,194\,304 \div 2^{10} \text{ TB}$ $= 4\,194\,304 \div 1\,048\,576 \text{ TB}$ $= 4096 \text{ TB}$	C															
6	Convert file size to MB A: 500 MB B: $500\,000 \text{ B} = 500\,000 \div 2^{20} \text{ MB} \approx 0.48 \text{ MB}$ C: $5000 \text{ KB} = 5000 \div 2^{10} \text{ MB} \approx 4.88 \text{ MB}$ D: $0.005 \text{ TB} = 0.005 \times 2^{20} \text{ MB} \approx 5242.88 \text{ MB}$	D															
7	$\text{Mean} = \frac{\sum fx}{\sum f}$ $= \frac{148}{36}$ ≈ 4.11 <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th>File size</th> <th>Frequency</th> <th>fx</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>12</td> <td>36</td> </tr> <tr> <td>4</td> <td>8</td> <td>32</td> </tr> <tr> <td>5</td> <td>16</td> <td>80</td> </tr> <tr> <td></td> <td>36</td> <td>148</td> </tr> </tbody> </table>	File size	Frequency	fx	3	12	36	4	8	32	5	16	80		36	148	C
File size	Frequency	fx															
3	12	36															
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	36	148															
8	There are 36 scores. Median is the average of the 18th and 19th score. Median is 4.	B															

Section II	Solution
1a	Charge = $0.30 + (270 \div 30) \times 0.30$ = \$3
b	Charge = $500 \times [0.25 + 0.20]$ = \$225 Monthly cost = $\$59 + \$225 - \$225$ (free calls \$300) = \$59
c	Simple - Monthly cost = $\$19 + 300 \times [0.35 + 0.40] - \100 = \$144 Regular - Monthly cost = $\$39 + 300 \times [0.30 + 0.30] - \180 = \$39 Super - Monthly cost = $\$59 + 300 \times [0.25 + 0.20] - \135 = \$59 Lara should choose the regular plan.
2a	Monthly service fee is \$20 (monthly calls is \$0)
b	\$45 (read from graph)
c	40 (read from graph)
3a	1GB = 1024 MB = 1 048 576 KB = 1 073 741 824 B Therefore 8GB = $8 \times 1 073 741 824 = 8 589 934 592$ B
b	12 TB = 12×2^{20} MB = 12 582 912 MB
c	9216 GB = $9216 \div 2^{10}$ TB = 9 TB
d	0.5 TB = 0.5×2^{10} GB = 512 GB
e	5 Tbps = 5×1000 Gbps = 5000 Gbps
f	1 Kbps = 1×1000 bps = 1000 bps
g	$3200\ 000\ 000$ bps = $3200\ 000\ 000 \div 1\ 000\ 000\ 000$ Gbps = 3.2 Gbps
h	$4\ 000\ 000$ Kbps = $4\ 000\ 000 \div 1\ 000\ 000$ Gbps = 4 Gbps