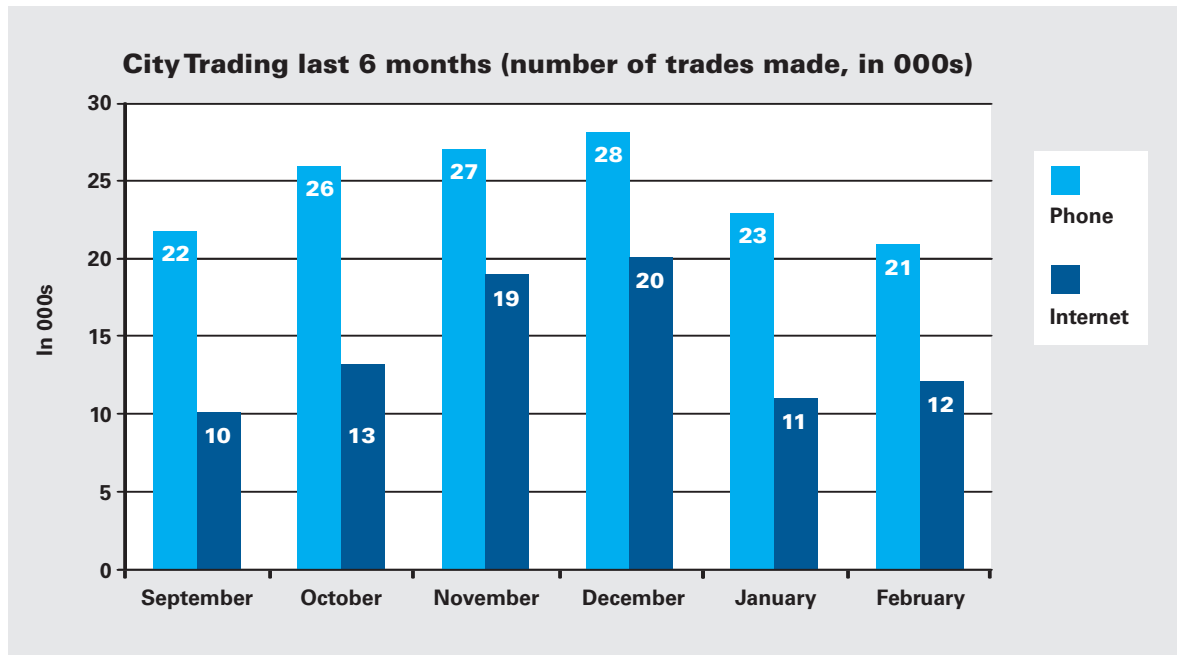


# NUMERICAL TEST **2**

## **Answer Booklet**

Please note – the correct answers are shown in bold

## Example Questions



**Ex 1** Between which two months was there the greatest change in the number of Internet trades made?

### Solution

We calculate the change in the number of Internet trades between months (in 000s):

$$\text{Change} = \text{Number trades Month (n)} - \text{Number trades Month (n - 1)}$$

Between	Change
September and October	3
October and November	6
November and December	1
December and January	-9
January and February	1

From this we can see the greatest change in the number of Internet trades occurred between December and January. As the Question only referred to the change in the number of trades and not whether the change should be positive or negative, the change in number between December and January is the correct answer.

### Tip

■ We should do these calculations mentally without resorting to a calculator. Once we have to resort to a calculator or pen and paper, we start losing time.

### Answer

A	B	C	D	E
September and October	October and November	November and December	<b>December and January</b>	January and February

**Ex 2** In September, approximately what proportion of the total number of trades was made up of Internet trades?

**Solution**

We consider September data.

We calculate what proportion of the total number of trades is made up of Internet trades (in 000s):

$$\begin{aligned}\text{Proportion of trades} &= \text{Number of Internet Trades} \div \text{Total number of Trades} \\ &= 10 \div (10 + 22) \\ &= 0.31 \text{ or } 31\%\end{aligned}$$

**Answer**

A	B	C	D	E
25%	<b>31%</b>	34%	37%	43%

## Test Questions

Photocopier service & running costs			
(Assume 52 weeks per year, 13 weeks per quarter)			
Photocopier	Expected average service & running cost per week (\$)	Actual Spend (\$) (Jan-March quarter)	Actual Spend (\$) (April-June quarter)
PHTCPR01	120	1,872	1,968
PHTCPR02	125	1,975	1,425
PHTCPR03	130	1,924	2,340
PHTCPR04	160	2,400	2,112
PHTCPR05	140	2,716	2,772
PHTCPR06	175	3,605	2,730

- 1** By how much have the actual service and running costs for Photocopier PHTCPR06 exceeded those for Photocopier PHTCPR05 so far this year?

### Solution

We need to calculate the actual running costs for Photocopier PHTCPR06 and PHTCPR05. We then subtract the value calculated for Photocopier PHTCPR05 from the value calculated for Photocopier PHTCPR06:

$$\begin{aligned}
 \text{Value Exceeded} &= \text{Actual Spend PHTCPR06} - \text{Actual Spend PHTCPR05} \\
 &= (3,605 + 2,730) - (2,716 + 2,772) \\
 &= 3,605 + 2,730 - 2,716 - 2,772 \quad (*) \\
 &= \$847
 \end{aligned}$$

### Answer

A	B	C	D	E
<b>\$847</b>	\$876	\$898	\$913	\$925

- 2** On which photocopier is there the least amount of budget left to spend this year?

### Solution

We calculate the expected spend for the year per photocopier and subtract from this value the Actual Spend for that photocopier. The photocopier with the smallest difference will be the answer:

$$\text{Expected Spend} = (\text{Average cost per week} \times 52) - \text{Actual Spend}$$

Photocopier	Expected spend	Actual Spend (to July)	Difference
PHTCPR01	6240	3840	2400
PHTCPR02	6500	3400	3100
PHTCPR03	6760	4264	2496
PHTCPR04	8320	4512	3808
PHTCPR05	7280	5488	1792
PHTCPR06	9100	6335	2765

From this table we can see photocopier PHTCPR05 or E is the correct answer.

**Tip**

- Looking at the answers provided for Question 2 we can see PHTCPR06 is not a possible answer so we know we don't need to consider this photocopier in our calculations.
- An alternative way for calculating the answer is:
- For each of the remaining 5 photocopiers we compare the actual average weekly spend (to July) with the expected average weekly spend (for the year).
- The photocopier with the greatest proportionate change between expected and actual average weekly spend will be the photocopier for which the actual spend has so far been the greatest, which would then be the photocopier with the least amount of budget left.

Example: For photocopier PHTCPR06,

$$\begin{aligned}\text{Expected average weekly cost} &= \$140 \\ \text{Actual average weekly cost} &= \$211.08 \\ \text{Proportionate change} &= 211.08/140 = 1.51\end{aligned}$$

**Answer**

A	B	C	D	E
Photocopier A	Photocopier B	Photocopier C	Photocopier D	<b>Photocopier E</b>

- 3** By what proportion should the service and running costs for Photocopier PHTCPR05 be increased next year if the actual spend recorded between January and June is a true reflection of service and running costs?

**Solution**

We calculate the percentage difference between the actual spend (to July) and the expected average spend (to July) for Photocopier PHTCPR05:

$$\begin{aligned}\text{Percentage difference} &= [(2,716 + 2,772) - (140 \times 26)] \div (140 \times 26) \times 100\% \\ &= 50.8\%\end{aligned}$$

This is the increase we are looking for.

**Answer**

A	B	C	D	E
38.9%	43.6%	48.7%	<b>50.8%</b>	53.3%

- 4** By how much is the annual spend on Photocopier PHTCPR01 likely to exceed that of Photocopier PHTCPR02 if the current spend recorded between January and June is a true reflection of actual service and running costs?

**Solution**

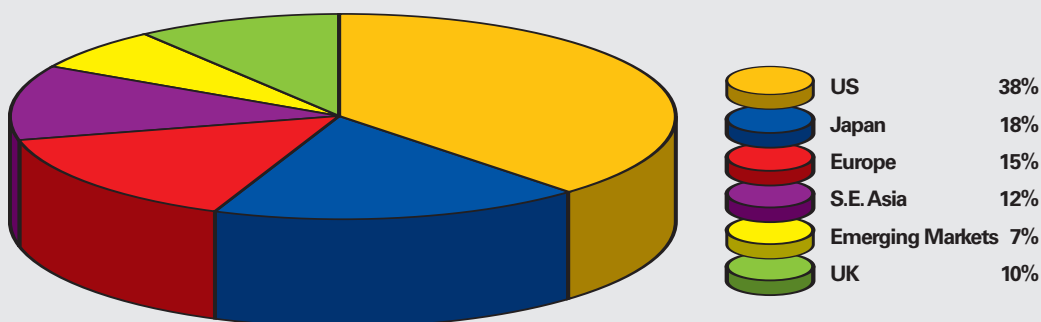
We calculate the difference in actual spend between the two photocopiers for the first six months. If the current spend is a true reflection, the spend in the next 6 months will be the same, so we double the difference calculated to get the answer:

$$\begin{aligned}\text{Difference in actual spend} &= [(1,872 + 1,968) - (1,975 + 1,425)] \times 2 \\ &= \$880\end{aligned}$$

**Answer**

A	B	C	D	E
\$740	\$820	<b>\$880</b>	\$960	\$1,120

**Current Breakdown of Global Equity Fund  
(Total of Fund Value = \$160 million)**



**Note on Question 5 – Question 8**

If we consider \$100 million as 100% the Total of Fund Value will then be 160% or 1.6 times the percentage value. Thus the Total of Fund Value of the UK holding will be  $1.6 \times 10 = 16$ , which is \$16 million. This ratio (1.6 per percentage point) can be used to speed up the calculations.

**5** What is the value of the Japanese holding in the Fund?

**Solution**

We calculate the value of the holding equivalent to 18% of the Total Fund Value (working in \$ millions):

$$\text{Value Japanese holding} = 18\% \times 160 = 28.8$$

**Tip**

See the note above.

**Answer**

A	B	C	D	E
\$24.0 million	<b>\$28.8 million</b>	\$32.8 Million	\$44.8 million	\$60.8 Million

**6** Which of the following combinations of holdings has a value of \$40 million?

**Solution**

We calculate what percentage of Total Fund Value amounts to \$40 million. We then see which holdings' share add up to this value:

$$\text{Percentage of Fund} = (40/160) \times 100\% = 25\%$$

UK holding and Europe holding add up to 25%.

**Tip**

See the note above Question 5.

**Answer**

A	B	C	D	E
Emerging Markets & S. E. Asia	Emerging Markets & UK	Europe & Japan	Europe & S. E. Asia	<b>Europe &amp; UK</b>

**7** By how much do the value of the holdings in the US and Japan exceed that of the value of all the other holdings combined?

**Solution**

We need to calculate the value of the difference in percentage between the US/Japan holdings and all the other holdings combined. We then calculate the value of \$160 million equivalent to this percentage:

$$\begin{aligned}\text{Difference in percentage values} &= 38 + 18 - 15 - 12 - 7 - 10 \\ &= 12\% \\ \text{Value equivalent to 12\% (working in \$ millions)} &= 160 \times 12\% \\ &= 19.2\end{aligned}$$

**Tip**

See the note above Question 5.

**Answer**

A	B	C	D	E
\$16.4 million	\$18.8 million	<b>\$19.2 million</b>	\$22.8 million	\$26.4 million

**8** Last year, the value of the S. E. Asia holding was 10% less than what it is now. What was the value of the S.E. Asia holding last year?

**Solution**

We calculate the value of the S.E. Asia holding and then calculate 90% of this to reach the answer (working in \$ millions):

$$\begin{aligned}\text{Value of S.E. Asia holding} &= 12\% \times 160 \\ &= 19.2 \\ 90\% \text{ of Value} &= 90\% \times 19.2 \\ &= 17.28\end{aligned}$$

**Tip**

See the note above Question 5.

**Answer**

A	B	C	D	E
<b>\$17.28 million</b>	\$17.45 Million	\$17.96 Million	\$18.48 million	\$19.05 million

Actuarial Table: Frequency of Driver Accidents				
Age Range	Accidents per Year		Accidents per million kilometres	
	Men	Women	Men	Women
Under 18	0.46	0.27	50	52
18-22	0.28	0.16	24	27
23-29	0.13	0.09	10	15
30-39	0.09	0.07	7	14
40-49	0.08	0.06	7	12
50-59	0.07	0.06	8	14
60-69	0.05	0.05	8	13
70 & over	0.06	0.04	12	12

- 9 In terms of kilometres driven, for which age range is the proportional difference between the number of accidents for men and women the greatest?

#### Solution

We calculate the proportional difference between the number of accidents for men and women for each age range (in Accidents per million kilometres):

$$\text{Proportional Difference} = (\text{Accidents Women} - \text{Accidents Men}) \div \text{Accidents Men}$$

Age Range	Proportional Difference
Under 18	0.040
18-22	0.125
23-29	0.500
30-39	1.000
40-49	0.714
50-59	0.750
60-69	0.625
70 & over	0.000

From this we can see that the greatest proportional difference is for the age range 30-39.

#### Tip

- From the answers provided we can ignore the proportionate differences for age ranges before 30-39.
- From the table provided for the question, a quick scan of the numbers involved should show that the range 30-39 is the answer. The easiest way to see this is to consider the equation:  

$$\text{Proportionate change} = \text{Accidents Women} \div \text{Accidents Men}$$
- For the numbers provided, these are all greater than 1. The proportionate difference is simply the Proportionate change minus 1.

#### Answer

A	B	C	D	E
30-39	40-49	50-59	60-69	70 & over



- 10** How many more accidents in a year will a group of a thousand 18-22 year old men be likely to have compared with a group of a thousand 18-22 year old women?

**Solution**

We consider the accidents per year for the age range 18-22. We first calculate the number of accidents for a group of thousand men and thousand women, and then calculate the difference:

$$\begin{aligned}\text{Accidents Men} &= 1000 \times 0.28 = 280 \\ \text{Accidents Women} &= 1000 \times 0.16 = 160 \\ \text{Difference} &= 120\end{aligned}$$

**Answer**

A	B	C	<b>D</b>	E
60	80	110	<b>120</b>	150

- 11** In terms of accidents per year, to what extent do women aged 40-49 have fewer accidents than men aged 23-29?

**Solution**

We consider the accidents per year for women aged 40-49 and men aged 23-29. We calculate the percentage difference in accidents between men aged 23-29 and women aged 40-49, relative to the number of accidents for men aged 23-29:

$$\begin{aligned}\text{Percentage difference} &= [(0.06 - 0.13) \div 0.13] \times 100 \\ &= 53.8\%\end{aligned}$$

The answer provided closest to this value is C: 54% less.

**Answer**

A	B	<b>C</b>	D	E
47% less	49% less	<b>54% less</b>	58% less	65% less

- 12** How many kilometres approximately does the average 18-22 year old woman drive per year?

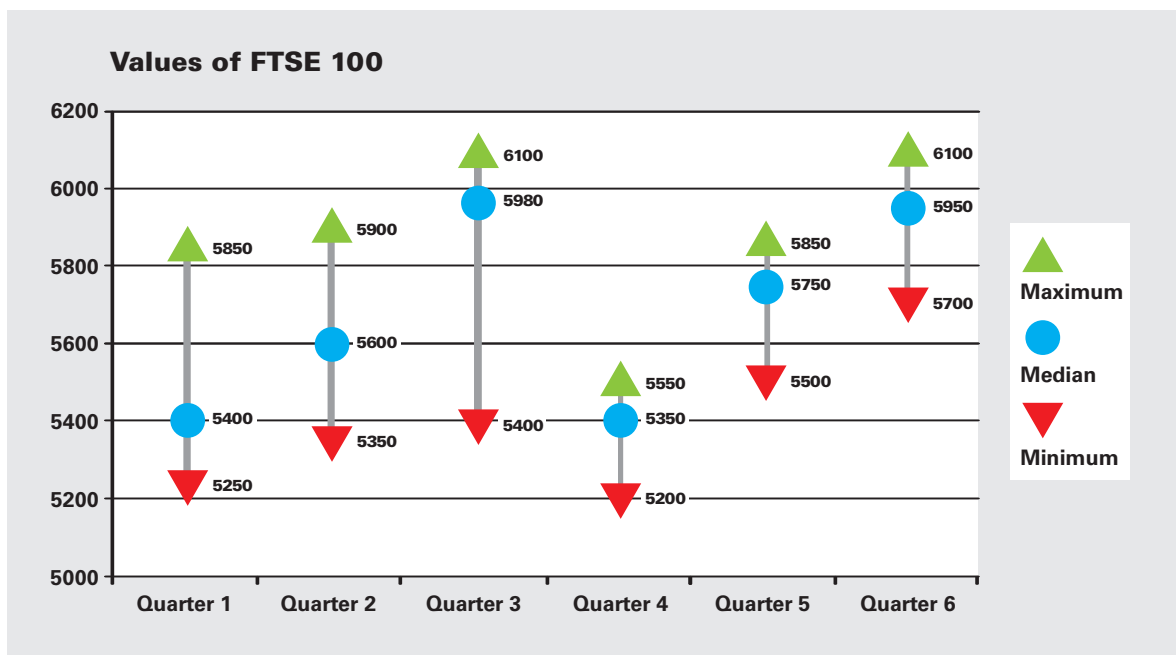
**Solution**

We consider woman in the age range 18-22 years. First we calculate the number of kilometres per accident. We then calculate what proportion of those kilometres will be driven in a year using the fact that only 0.16 accidents happen for women in the age group per year:

$$\begin{aligned}\text{Number of kilometres per accident} &= 1,000,000 \div 27 = 37,037 \text{ km} \\ \text{Proportion of this driven in a year} &= 37,037 \times 0.16 = 5,926 \text{ km}\end{aligned}$$

**Answer**

A	B	C	D	<b>E</b>
4,884 km	4,929 km	5,246 km	5,624 km	<b>5,926 km</b>



**13** Which quarter saw the greatest range in the value of the FTSE 100?

**Solution**

We calculate the range for each of the quarters and from this establish the greatest range:

Quarter	Range
1	600
2	550
3	700
4	350
5	350
6	400

From this we see the greatest range is in Quarter 3

**Tip**

- From the answers provided we see we can ignore Quarter 6.
- From the graph provided we can see that the range for Quarter 3 is the largest by considering the length of the line connecting minimum and maximum values.
- We can confirm this by checking the actual value difference between minimum and maximum for this Quarter and comparing it to some of the other Quarters if necessary.

**Answer**

A	B	C	D	E
Quarter 1	Quarter 2	<b>Quarter 3</b>	Quarter 4	Quarter 5

**14** Between which two quarters was there the smallest proportional change in the median value of the FTSE 100?

**Solution**

We calculate the proportional change in median value between each quarter respectively:

$$\text{Proportional change} = (\text{Median2} - \text{Median1}) \div \text{Median1}$$

Between	Proportional change
Q1-Q2	0.037
Q2-Q3	0.068
Q3-Q4	-0.105
Q4-Q5	0.075
Q5-Q6	0.035

From this we see Quarter 5 to Quarter 6 has the smallest proportional change.

**Tip**

- For the smallest proportional change we are looking for a small change and large median values.
- Both Q1-Q2 and Q5-Q6 fit this requirement and both have a difference in median value of 200.
- The median value of Q5 is larger than the median value of Q1 so Q5-Q6 would be our answer.

**Answer**

A	B	C	D	E
Quarter 1 to Quarter 2	Quarter 2 to Quarter 3	Quarter 3 to Quarter 4	Quarter 4 to Quarter 5	<b>Quarter 5 to Quarter 6</b>

**15** If in Quarter 7, the minimum value of the FTSE 100 increases by 15% but the maximum value increases by 20%, what will the difference be between the minimum and maximum value for that quarter?

**Solution**

We calculate the associated increase for both the minimum and maximum values from Quarter 6 to Quarter 7. We then calculate the difference between the two values:

For Q7:

$$\begin{aligned} \text{Increase in maximum value} &= \text{Q6 maximum} \times 120\% \\ &= 6100 \times 120\% \\ &= 7320 \end{aligned}$$

$$\begin{aligned} \text{Increase in minimum value} &= \text{Q6 minimum} \times 115\% \\ &= 5700 \times 115\% \\ &= 6555 \end{aligned}$$

Difference in Q7 minimum and maximum value:

$$\begin{aligned} \text{Difference} &= 7320 - 6555 \\ &= 765 \end{aligned}$$

**Answer**

A	B	C	D	E
745	755	760	<b>765</b>	775

- 16** The median value of the FTSE 100 is expected to increase by 3% per quarter for the next 4 quarters, what will the median value be in Quarter 10?

**Solution**

We need to calculate the compound increase of the median value over 4 quarters from Q6 to Q10:

$$\begin{aligned}\text{Increase in median value} &= \text{Q6 median} \times (1.03)^4 \\ &= 5950 \times 1.1255 \\ &= 6697\end{aligned}$$

**Answer**

A	B	C	D	E
6,656	6,683	<b>6,697</b>	6,714	6,725

Average Value of US Dollar (\$)		
Currency	Year 1	Year 2
Euro (Eur)	0.78	0.64
Pound Sterling (£)	0.53	0.45
Japanese Yen (¥)	112	95
Swiss Franc (CHF)	1.21	1.10
Hong Kong Dollar (HK\$)	7.75	6.20

- 17** How much was a Japanese Yen worth in US dollars in Year 1?

**Solution**

Considering Year 1 we know that 1 US Dollar is worth 112 Japanese Yen. We calculate the inverse to establish how much 1 Japanese Yen is worth in terms of US Dollars:

$$\text{US Dollars per Japanese Yen} = 1/112 = 0.0089$$

**Answer**

A	B	C	D	E
\$0.0009	<b>\$0.0089</b>	\$0.011	\$0.089	\$0.105

- 18** How much more £ Sterling could have been purchased with 2000 US Dollars in Year 1 compared to Year 2?

**Solution**

Considering Pound Sterling, we calculate the difference in how much £ Sterling, 2000 US Dollars you can purchase in year 1 and Year 2.

$$\begin{aligned}\text{Difference} &= 2000 \times (\text{Pound Sterling Year 1} - \text{Pound Sterling Year 2}) \\ &= 2000 \times (0.53 - 0.45) \\ &= 160\end{aligned}$$

**Answer**

A	B	C	D	E
£ 145	£ 150	£ 155	<b>£ 160</b>	£ 165

**19** Between Year 1 and Year 2, the value of the Swiss Franc in relation to the US dollar, moved:

**Solution**

We calculate the change in value of the Swiss Franc in relation to the US Dollar from Year 1 to Year 2.

We calculate this using:

$$\begin{aligned}\text{Percentage change} &= \{[(1/\text{Year 2 Value}) - (1/\text{Year 1 Value})] \div (1/\text{Year 1 Value})\} \times 100\% \\ &= \{[(1/1.10) - (1/1.21)] \div (1/1.21)\} \times 100\% \\ &= 10\%\end{aligned}$$

Answer E: Up 9.1% is the closest answer to this value.

**Tip**

A way to understand this calculation is to consider the following, simplified scenario:

In Year 1 a shirt costs \$1.

In Year 2 the same shirt costs \$2.

Looking at this we can see that the value of the shirt has increased 100% in relation to the Dollar:

$$\begin{aligned}\text{Change of value of the shirt} &= [(\$2 - \$1) \div \$1] \times 100\% \\ &= 100\%\end{aligned}$$

Conversely, the value of the Dollar has decreased 50% in relation to the shirt:

$$\begin{aligned}\text{Change of value of Pound Sterling} &= \{[(1/\$2) - (1/\$1)] \div (1/\$1)\} \times 100\% \\ &= -50\%\end{aligned}$$

We apply the same principle to calculate the change in value of the Swiss Franc in relation to the US Dollar by replacing the shirt with a US Dollar and the Dollar with Swiss Franc.

**Answer**

A	B	C	D	E
Down 9.1%	Down 8.3%	Down 1.7%	Up 8.3%	<b>Up 9.1%</b>

**20** In Year 1, US\$ 200 was used to purchase a holding of Euros. What would the value of this holding be if exchanged for HK\$ in Year 2?

**Solution**

We have to calculate a series of conversions to get to the answer:

200 US Dollar -> Euro (Year 1) -> Dollar (Year 2) -> HK\$ (Year 2)

In terms of exchange values this series of conversions is:

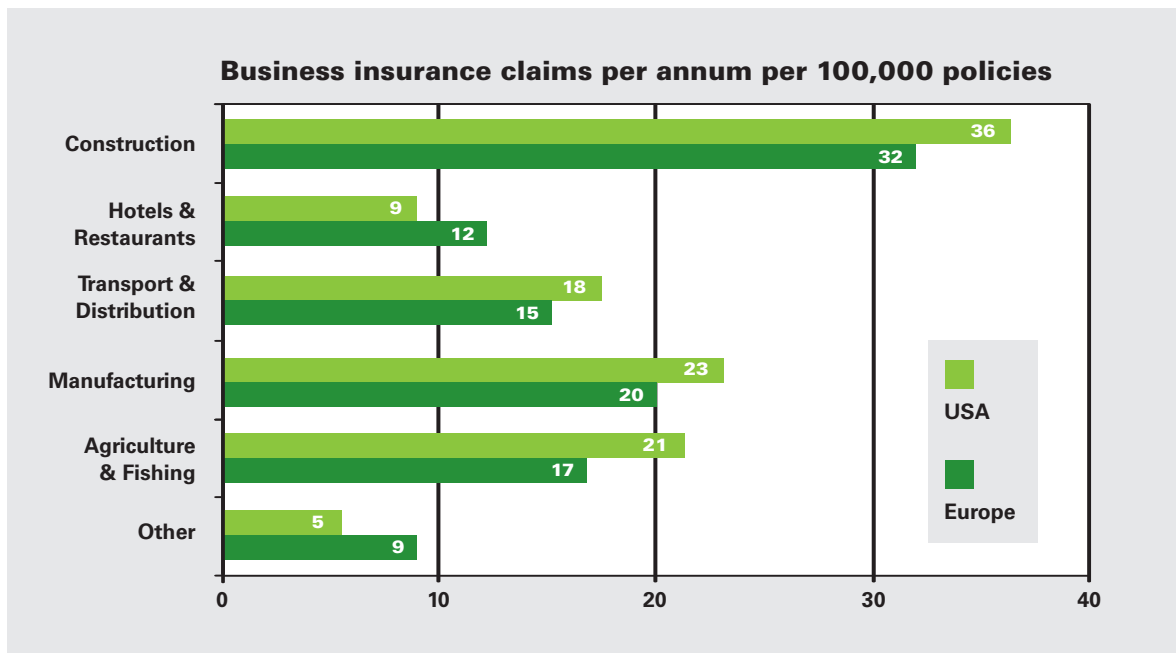
$$200 \rightarrow 200 \times 0.78 \rightarrow (200 \times 0.78) \div 0.64 \rightarrow [(200 \times 0.78) \div 0.64] \times 6.2$$

So, putting that together:

$$\begin{aligned}200 \text{ US Dollar (Year 1) in HK\$ (Year 2)} &= [(200 \times 0.78) \div 0.64] \times 6.2 \\ &= \text{HK\$ } 1,511\end{aligned}$$

**Answer**

A	B	C	D	E
HK\$ 1,313	HK\$ 1,412	<b>HK\$ 1,511</b>	HK\$ 1,610	HK\$ 1,709



- 21** Assuming there were 1,250,000 insurance policies issued annually in Europe to cover the Manufacturing sector, how many claims would be expected per year?

**Solution**

Considering cover for the Manufacturing sector, we know that 20 claims are made in Europe per 100,000 policies. We calculate the number of 100,000 policies in 1,250,000 policies and multiply by the number of claims per year:

$$\begin{aligned} \text{Number of expected claims} &= (1,250,000 \div 100,000) \times 20 \\ &= 250 \end{aligned}$$

**Answer**

A	B	C	D	E
250	400	500	550	600

- 22** Comparing the USA with Europe, which business sector has the most similar number of claims on a proportional basis?

**Solution**

We consider the proportional difference between claims per 100,000 for USA and Europe, for each industry:

$$\text{Proportional difference} = (\text{claims USA} - \text{claims Europe}) \div (\text{claims USA} + \text{claims Europe})$$

Sector	Proportional difference
Construction	0.06
Hotels & Restaurants	0.14
Transport & Distribution	0.09
Manufacturing	0.07
Agriculture & Fishing	0.11
Other	0.29

From this we can see Construction' has the most similar number of claims.

**Tip**

- We could have derived the answer by looking at the chart provided.
- We are looking for a small difference in claims and a large number of total claims.
- As the differences for all sectors are either 3 or 4, we can see that Construction has by far the largest number of claims (considerably more than the others).
- This sector will thus give us the smallest proportional difference.

**Answer**

A	B	C	D	E
<b>Construction</b>	Hotels & Restaurants	Transport & Distribution	Manufacturing	Agriculture & Fishing

- 23** There are on average 6 times as many claims made per annum in the USA compared to Europe in the Transport & Distribution sector. How many more policies are issued in the US compared to Europe in this sector?

**Solution**

We consider the Transport & Distribution sector. If we assume only 15 claims have been made in Europe for this sector for the year, we can fix the number of policies sold in Europe to 100,000.

On average 6 times as many claims are made per annum in the USA compared to Europe which amounts to 90 claims ( $6 \times 15$ ).

From this we know that the number of policies sold in the USA is:

$$\begin{aligned}\text{Number of policies sold} &= (90 \div 15) \times 100,000 \\ &= 600,000\end{aligned}$$

From this we know that 6.0 times more policies were sold in the USA compared to Europe.

**Answer**

A	B	C	D	E
3.3 times as many	4 times as many	4.3 times as many	<b>6.0 times as many</b>	5.5 times as many

- 24** Last year there were 630 claims made in the USA against policies written out in the Agriculture & Fishing sector. How many policies were issued that year for that sector?

**Solution**

We consider the Agriculture & Fishing sector in the USA. We calculate the number of policies issued that year using the fact that 21 claims are made per 100,000 policies sold. This number of policies sold for 630 claims to be made is:

$$\begin{aligned}\text{Number of policies sold} &= (630 \div 21) \times 100,000 \\ &= 3,000,000\end{aligned}$$

**Answer**

A	B	C	D	E
2,670,000	<b>3,000,000</b>	4,330,000	5,000,000	6,300,000