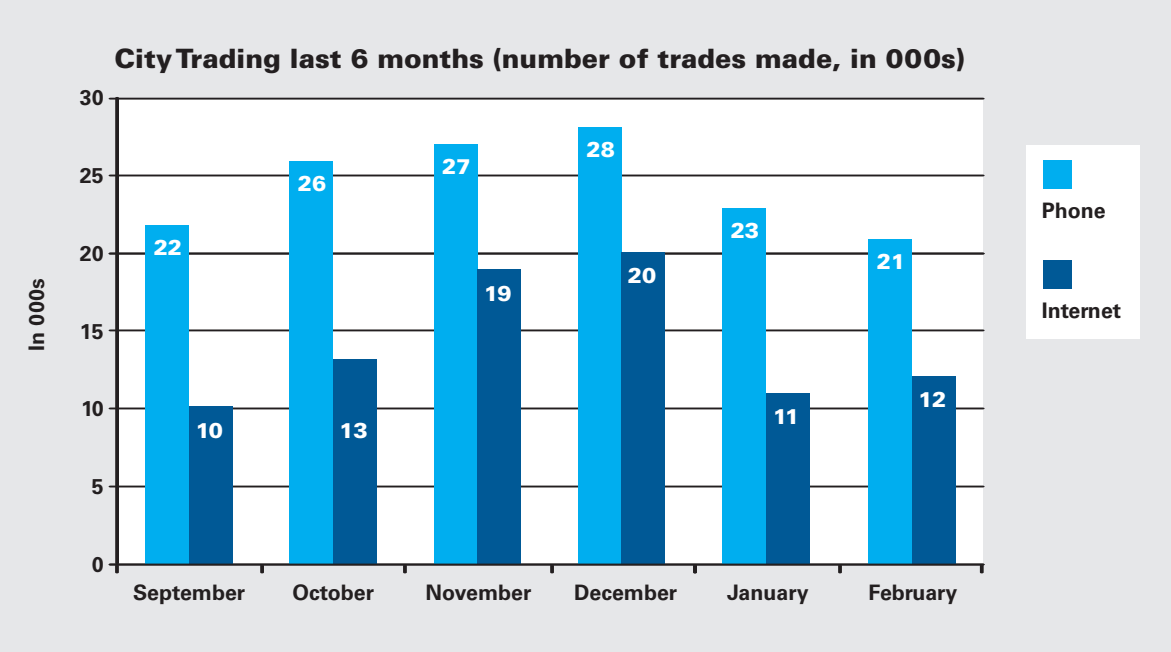
# NUMERICAL TEST 3

## 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):

Change = Number trades Month (n) – 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 | **December and January** | 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.

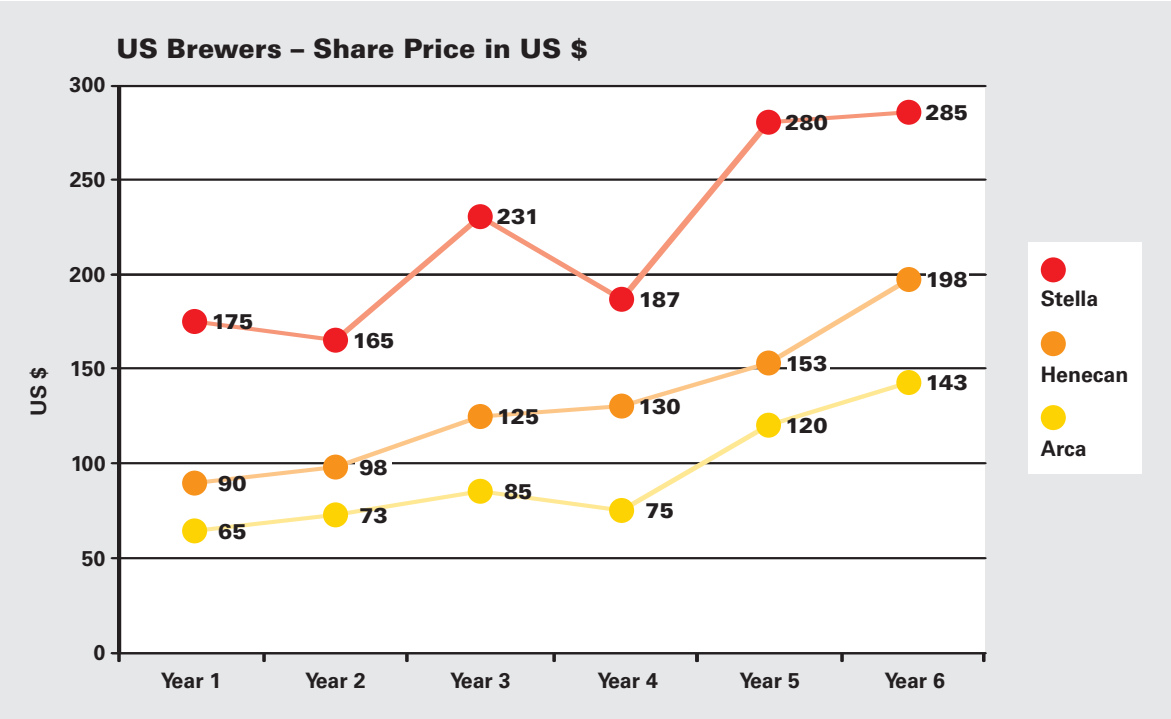
We calculate what proportion of the total number of trades is made up of Internet trades (in 000s):

Proportion of trades = Number of Internet Trades ÷ Total number of Trades
= 10 ÷ (10 + 22)
= 0.31 or 31%

**Answer**

| A | **B** | C | D | E |
|---|---|---|---|---|
| 25% | **31%** | 34% | 37% | 43% |

## Test Questions




**1** For how many years was the price of Arca shares closer to that for Stella than for Henecan?

**Solution**

We calculate the differences in share prices:

| Year | Difference between Arca share price and Stella share price | Difference between Henecan share price and Arca share price |
|---|---|---|
| 1 | $90 – $65 = $25 | $175 – $90 = $85 |
| 2 | $98 – $73 = $25 | $165 – $98 = $67 |
| 3 | $125 – $85 = $40 | $231 – $125 = $106 |
| 4 | $130 – $75 = $55 | $187 – $130 = $57 |
| 5 | $153 – $120 = $33 | $280 – $153 = $127 |
| 6 | $198 – $143 = $55 | $285 – $198 = $87 |

From these calculations we can see that the difference in share price between Arca and Stella is smaller than the difference in share price between Henecan and Arca for each of the 6 years. Thus the Arca share price is closer to the Stella share price for all of the 6 years.

**Tip**

- Visually inspecting the chart provided, we can see that Arca share price is closer to the Stella share price for all 6 years except, maybe, Year 4.
- A quick calculation shows that the Arca share price is closer to the Stella share price even for Year 4.
- Thus, the Arca share price was closer to the Stella share price for all 6 years.

**Answer**

| A | B | C | D | **E** |
|---|---|---|---|---|
| 2 | 3 | 4 | 5 | **6** |

## 2 If the percentage increase in the Arca share price between Years 5 and 6 is doubled for the period Year 6 to 7, what will the value of the share price be in Year 7?

**Solution**

We consider the Arca share price.

We calculate the percentage increase in share price between Year 5 and Year 6:

Percentage increase = (Year 6 share price ÷ Year 5 share price) – 1
= ($198/$153) – 1
= 1.2941 – 1
= 0.2941 or 29.41%

The question indicates that the expected increase from Year 6 to Year 7 is double that of the increase from Year 5 to Year 6, an increase of (2 × 0.2941) = 0.58822.

The Year 7 share price is then:

Year 7 share price = [$198 × (1 + 0.58822)]
= $314.47

The closest answer provided is $314.

**Answer**

| A | **B** | C | D | E |
|---|---|---|---|---|
| $297 | **$314** | $321 | $328 | $335 |

## 3 Between which two years did the change in Stella's share price most closely match the change in Henecan's share price?

**Solution**

We compare the percentage change in share prices by considering the proportional change in share price between consecutive years per company (this makes the calculations faster without any loss of accuracy):

Proportional change = (Share price Year n+1 ÷ Share price Year n)

| Year | Stella proportional change | Henecan proportional change |
|---|---|---|
| Year 1 – Year 2 | $73/$65 = 1.1231 | $165/$175 = 0.9429 |
| Year 2 – Year 3 | $85/$73 = 1.1644 | $231/$165 = 1.4 |
| Year 3 – Year 4 | $75/$85 = 0.8824 | $187/$231 = 0.7229 |
| Year 4 – Year 5 | $120/$75 = 1.6 | $280/$187 = 1.4973 |
| Year 5 – Year 6 | $143/$120 = 1.1917 | $285/$280 = 1.0179 |

Comparing these values we see that the difference in proportional change in share price between Year 4 and Year 5 is the smallest and, thus, they are the closest match.

**Tip**

- A visual scan of the chart provided shows that the likely years would be, Year 4 to Year 5 or Year 5 to Year 6.
- We calculate the proportionate changes for these 2 time periods only, reducing the number of calculations necessary.

**Answer**

| A | B | C | **D** | E |
|---|---|---|---|---|
| Year 1 to Year 2 | Year 2 to Year 3 | Year 3 to Year 4 | **Year 4 to Year 5** | Year 5 to Year 6 |

**4** If in the year prior to Year 1 the share prices of Henecan and Stella were both 10% higher, what was the actual difference in these share prices in that year?

**Solution**

We calculate the share price for each company for the year prior to Year 1. Taking each company in turn, we calculate the 10% increase in share price as follows:

Prior share price = 1.1 × Company Year 1 share price

So,

Henecan:

Prior share price = 1.1 × $175
= $192.5

Stella:

Prior share price = 1.1 × $65
= $71.5

Now we calculate the difference in share price:

Difference in share price = $192.5 – $71.5
= $121

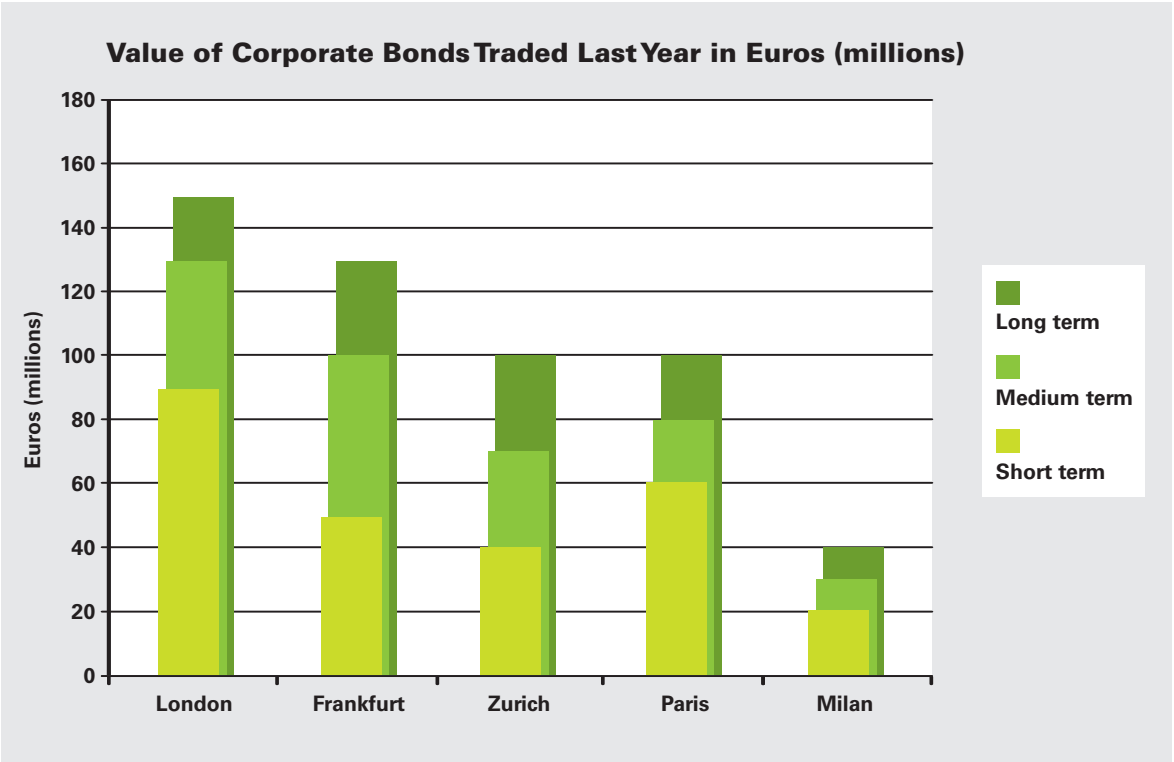
**Tip**

- A faster way of calculating this value is to consider the increase in difference in share price.
- We can do this as both share prices increase by the same amount, 10%.

Difference in share price = ($175 – $65) × 1.1
= $121

**Answer**

| **A** | B | C | D | E |
|---|---|---|---|---|
| **$121** | $125 | $131 | $137 | $142 |




**5** What was the difference in the value of Medium Term Bonds trades in Frankfurt compared to Paris?

**Solution**

We calculate the difference in value of Medium Term Bonds trades (in Euro millions):

Difference = Value of trades in Frankfurt – Value of trades in Paris
= 50 – 20
= 30

**Answer**

| **A** | B | C | D | E |
|---|---|---|---|---|
| **30 million euros** | 40 million euros | 50 million euros | 60 million euros | 70 million euros |

**6** By how much did the total value of all Short Term Bonds traded exceed that of all Long Term Bonds traded?

**Solution**

We calculate the difference in value of all Short Term Bonds traded and all Long Term Bonds traded (in Euro millions):

Difference = total value Short Term Bonds – total value Long Term Bonds
= (90 + 50 + 40 + 60 + 20) – (20 + 30 + 30 + 20 + 10)
= 150

**Answer**

| A | B | C | **D** | E |
|---|---|---|---|---|
| 120 million euros | 130 million euros | 140 million euros | **150 million euros** | 160 million euros |

## 7 As a proportion, which location traded the fewest Medium Term Bonds?

### Solution

We calculate the value Medium Term Bonds traded as a proportion of the total Bonds Traded per Location. The Location with the smallest proportion is what we are looking for:

Proportion = Medium Terms Bonds traded ÷ Total Bonds traded

| Location | Proportion |
|---|---|
| London | 0.267 |
| Frankfurt | 0.385 |
| Zurich | 0.300 |
| Paris | 0.200 |
| Milan | 0.250 |

From this we can see that Paris, as a proportion, traded the fewest Medium Term Bonds.

### Tip

- To find the correct answer we have to look for a location where a small amount of Medium Bonds are traded and a large overall amount of Bonds.
- This will provide a small proportion which is what we are looking for.
- Looking at the chart provided, there are two likely locations: London and Paris.
- Looking at the Paris trades and comparing to Paris we can see London should have at least a total value of trade over 200 million Euros to have a smaller proportion than Paris.
- This makes Paris the answer.

### Answer

| A | B | C | **D** | E |
|---|---|---|---|---|
| London | Frankfurt | Zurich | **Paris** | Milan |

## 8 Across these 5 locations, by what proportion would the volume of trading in Long Term Bonds have to increase in order to match the current volume of trading in Medium Term Bonds?

### Solution

We calculate the total volume of trading in both Long Term and Medium Term Bonds. We then calculate the percentage increase in trading of Long Term Bonds in order to match the current volume of trading in Medium Term Bonds.

Total Volume traded (working in millions of Euros):

Long Term = 110

Medium Term = 150

Percentage difference = (150/110) × 100%

= 36.4%

### Answer

| A | B | **C** | D | E |
|---|---|---|---|---|
| 31.6% | 33.5% | **36.4%** | 38.1% | 39.4% |

| Direct Wine Company: Annual Sales and Profit figures (in $000s) | | | | | | |
|---|---|---|---|---|---|---|
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| **Total Sales** | 5,020 | 4,400 | 4,850 | 5,150 | 5,220 | 5,820 |
| **Total Profits = (Total Sales - Total Costs)** | 600 | 270 | -230 | -380 | 310 | 580 |

## 9 In which year did Total Costs equal approximately 90% of Total Sales?

**Solution**

We calculate the Total Costs and then the percentage this value is for each of the years (in $ 000s):

Total Costs = Total Sales – Total Profits

| Year | Total Costs | As Percentage of Total Sales |
|---|---|---|
| Year 1 | 4420 | 88.0% |
| Year 2 | 4130 | 93.9% |
| Year 3 | 5080 | 104.7% |
| Year 4 | 5530 | 107.4% |
| Year 5 | 4910 | 94.1% |
| Year 6 | 5240 | 90.0% |

From this we can see Year 6 is the correct answer.

**Tip**

- Considering the table of data provided, we look for the year for which the Total Profits is 10% of the Total Sales.
- We can ignore Year 3 and Year 4 as these do not have any profits and thus will have greater Costs than Sales.
- We can see that Year 6 has a Total Profits that is 10% of Total Sales, which is what we are looking for.

**Answer**

| A | B | **C** | D | E |
|---|---|---|---|---|
| Year 2 | Year 3 | **Year 4** | Year 5 | Year 6 |

## 10 In which one of the following years were Total Costs the highest?

**Solution**

We calculate the Total Costs for each of the years and from this establish the year with the highest Total Costs (in $ 000s):

| Year | Total Costs |
|---|---|
| Year 1 | 4,420 |
| Year 2 | 4,130 |
| Year 3 | 5,080 |
| Year 4 | 5,530 |
| Year 5 | 4,910 |
| Year 6 | 5,240 |

From this we can see Year 4 is the year with the highest Total Costs.

**Tip**

- Looking at the data provided, we can see that Year 4 or Year 6 would have the highest Total Costs as these years have the highest Total Sales values.
- For Year 4 we add $380,000 to the Total Sales to establish Total Costs.
- Comparing this value of Total Costs to Year 6 Total Costs (Total Sales minus Total Profits) we see Year 4 is the correct answer.

**Answer**

| A | B | **C** | D | E |
|---|---|---|---|---|
| Year 2 | Year 3 | **Year 4** | Year 5 | Year 6 |

## 11 What was the average annual profit over the 6-year period?

**Solution**

We calculate the average profit over the 6-year period (in $ 000s):

Average Profit = Total Profits ÷ 6
= (600 + 270 + (-230) + (-380) + 310 + 580) ÷ 6
= 191.666

**Answer**

| A | **B** | C | D | E |
|---|---|---|---|---|
| $187,666 | **$191,666** | $212,333 | $223,133 | $266,633 |

## 12 In Year 1, compared with the previous year, both Total Sales and Total Profits rose by 10% each. What approximately were the Total Costs in the year prior to Year 1?

**Solution**

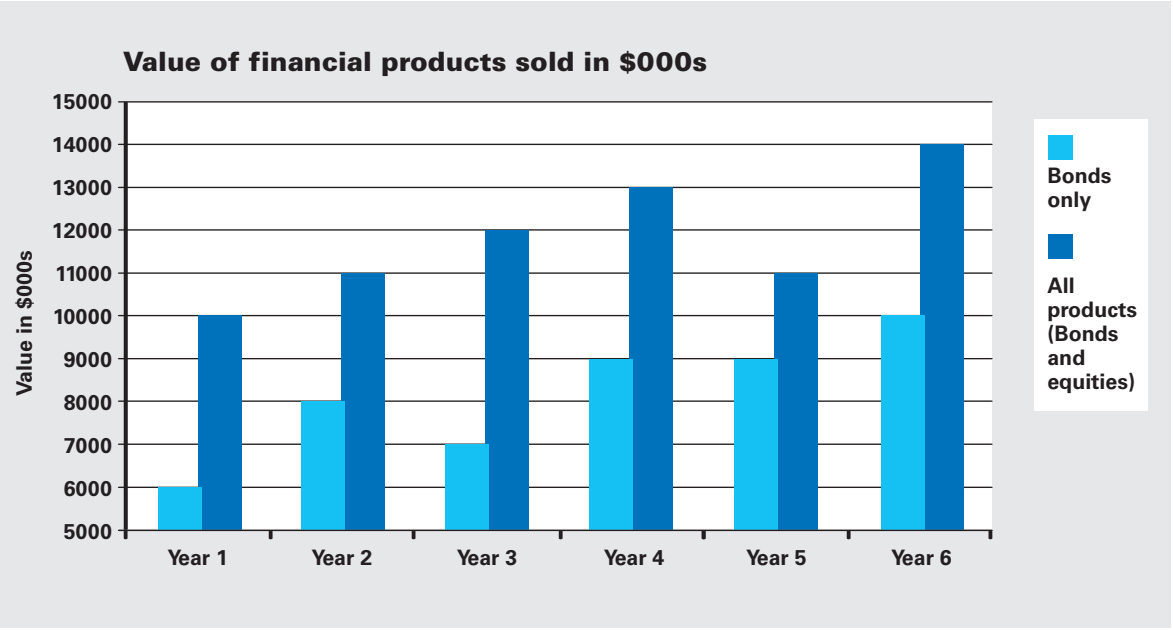
As we are asked for an approximate value for Total Costs, we can calculate the value using mental arithmetic. Working in $ 000s:

Both Total Sales and Total Profits are 10% less in the year prior to Year 1. From this we know that the Total Costs will also be 10% less than the Total Costs in Year 1. Total Costs in Year 1 is a bit less than 4,500. 10% of this value is a bit less than 4,050.

The answer is thus 4,018 or A.

**Answer**

| **A** | B | C | D | E |
|---|---|---|---|---|
| **$4,018,182** | $4,096,000 | $4,128,573 | $4,282,000 | $4,376,925 |




## 13 What was the average value of Bonds sold per annum over the 6-year period?

**Solution**

We calculate the average value of the Bonds Sold per annum over the 6-year period. (Considering the chart we have to remember that the "Value in $000s" does not start at 0 but 5000.) Working in $ 000s:

$$\text{Average Value} = (6000 + 8000 + 7000 + 9000 + 9000 + 10000) \div 6$$
$$= 8166$$

The answer closest to this value is C: $8.17 million.

**Answer**

| A | B | **C** | D | E |
|---|---|---|---|---|
| $7.33 million | $7.83 million | **$8.17 million** | $8.53 million | $8.83 million |

## 14 The biggest proportional increase in the sales of Equity products took place between which two years?

### Solution

We calculate the proportional change in the sales of Equities (in $ 000s):

Value of Equities sold = All Products – Bonds only

Proportional Change = (Value Year n – Value Year n–1) ÷ Value Year n–1

| Year | Proportional change |
|---|---|
| Year 1 – Year 2 | -0.25 |
| Year 2 – Year 3 | 0.67 |
| Year 3 – Year 4 | -0.20 |
| Year 4 – Year 5 | -0.50 |
| Year 5 – Year 6 | 1.00 |

From this we can see the biggest proportional increase in the sales of Equity products is Year 5 – Year 6.

### Tip

- Visually inspecting the chart, we can see the only increases in the sales of Equity products were for Year 2 to Year 3 and Year 5 to Year 6.
- Year 2 to Year 3 has a change from 3 to 5 units.
- Year 5 to Year 6 has a change from 2 to 4 units. This is the time period with the greatest proportional increase.

### Answer

| A | B | C | D | **E** |
|---|---|---|---|---|
| Year 1 and Year 2 | Year 2 and Year 3 | Year 3 Year 4 | Year 4 and Year 5 | **Year 5 and Year 6** |

## 15 In which year did Bonds represent the largest proportion of total financial products sold?

**Solution**

We calculate the proportion that Bonds represent of total financial products sold, for each year:

Proportion = Value Bonds ÷ total financial products sold

| Year | Proportion |
|---|---|
| Year 1 | 0.600 |
| Year 2 | 0.727 |
| Year 3 | 0.583 |
| Year 4 | 0.692 |
| Year 5 | 0.818 |
| Year 6 | 0.714 |

From this we can see that for Year 5 Bonds represented the largest proportion of total financial products sold.

**Tip**

- Visually inspecting the chart provided, we look for the year with smallest difference between all products and Bonds, and large values for both.
- Year 5 fits these criteria the best.

**Answer**

| A | B | C | **D** | E |
|---|---|---|---|---|
| Year 2 | Year 3 | Year 4 | **Year 5** | Year 6 |

## 16 If in Year 7 the value of Bond products increases by 10% and the value of Equity products increase by 15%, what will the total value of sales be?

**Solution**

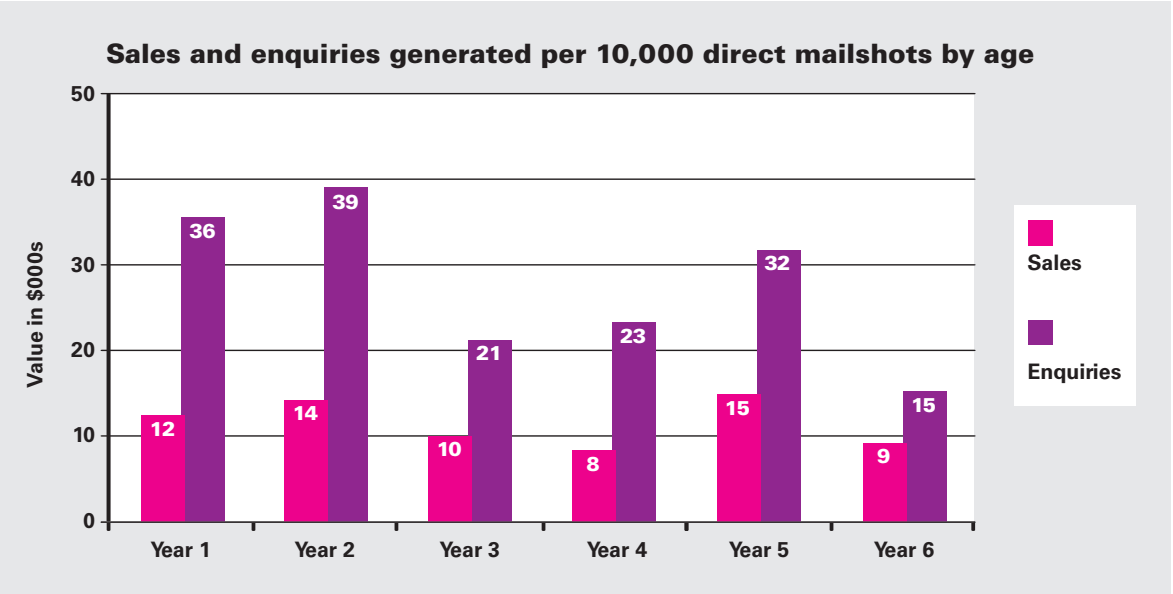
We calculate the increases in value for Bond products and Equity products and then add these together to calculate the total value of sales (in $ 000s):

Year 7:

| | | |
|---|---|---|
| Value of Bond products | = | 10,000 × 110 |
| | = | 11,000 |
| Value of Equity products | = | (14,000 – 10,000) × 115% |
| | = | 4,600 |
| Total value of sales | = | 11,000 + 4,600 |
| | = | 15,600 |

**Answer**

| A | **B** | C | D | E |
|---|---|---|---|---|
| $14.85 million | **$15.60 million** | $15.75 million | $17.25 million | $18.35 million |




## 17 Which age range shows the smallest number of sales per enquiry?

### Solution

We calculate the number of sales per enquiry for each age range. From this we establish the age range with the smallest number of sales per enquiry:

Sales per enquiry = Sales ÷ Enquiries

| Age Range | Sales per Enquiry |
|---|---|
| 16-24 years old | 0.333 |
| 25-34 years old | 0.359 |
| 35-44 years old | 0.476 |
| 45-54 years old | 0.348 |
| 55-64 years old | 0.469 |
| 65 years and over | 0.600 |

From this we can see that the age range "16-24 years old" has the smallest number of sales per enquiry.

### Tip

- Visually inspecting the chart provided we look for age ranges where the number of enquiries is large and the number of sales small.
- Age ranges "16-24 years old" and "25-34 years old" seem like the most likely candidates.
- We can see the number of sales per enquiry for "16-24 years old" is 1/3. For the age range "25-34 years old" to have a smaller sale per enquiry ratio, the number of sales would have to be less than 13.
- The sales for this age range are 14.
- Thus the age range "16-24 years old" is the correct answer.

### Answer

| **A** | B | C | D | E |
|---|---|---|---|---|
| **16-24 years** | 25-34 years | 35-44 years | 45-54 years | 55-64 years |

## 18 Assuming 400,000 mail shots were sent out to 25-34 year olds, how many more enquiries would be generated compared to actual sales?

**Solution**

We calculate the number of enquiries and actual sales generated by 400,000 mail shots. The chart provided indicates the data represented is for 10,000 mail shots, so we calculate the actual sales and enquiries generated using:

Actual Sales = (400,000 ÷ 10,000) × 14
= 560

Enquiries = (400,000 ÷ 10,000) × 39
= 1,560

Thus a 1000 more enquiries are generated than actual sales.

**Tip**

As the ratio of (400,000 ÷ 10,000) is the same for both equations we need only multiply the difference between actual sales and enquiries by this ratio:

Difference between enquiries and sales = (400,000 ÷ 10,000) × (39 – 14) = 1,000

**Answer**

| A | B | **C** | D | E |
|---|---|---|---|---|
| 800 | 900 | **1,000** | 1,100 | 1,200 |

## 19 Last year there were 630 sales recorded for the 45-54 year old group. How many mail shots would have been sent out to reach this figure?

**Solution**

We calculate the number of mail shots by calculating how many batches of 10,000 would have had to be sent out to achieve 630 sales:

Number of batches = 630 ÷ 8
= 78.75

Number of mail shots = 78.75 × 10,000
= 787,500

**Answer**

| A | B | C | D | **E** |
|---|---|---|---|---|
| 630,500 | 625,000 | 685,500 | 760,000 | **787,500** |

**20** In one year, there were 1.9 million mail shots sent out to people aged 65 and over compared to 1.1 million mail shots sent out to people aged 16-24 years old. How many more sales were likely to have been made to people aged 65 and over?

**Solution**

We calculate the number of sales generated for each of the age ranges "65 years and older" and "16-24 years old" by the respective mail shots:

| | | |
|---|---|---|
| Sales for 65 years and over | = | (1.9 million ÷ 10,000) × 9 |
| | = | 1,710 |
| Sales for 16-24 years old | = | (1.1 million ÷ 10,000) × 12 |
| | = | 1,320 |
| Difference in sales generated | = | 1,710 -1,320 |
| | = | 390 |

**Answer**

| A | B | **C** | D | E |
|---|---|---|---|---|
| 270 | 336 | **390** | 484 | 533 |

| **Average Value of Euro (Eur)** | | |
|---|---|---|
| **Currency** | **Year 1** | **Year 2** |
| US Dollar ($) | 1.28 | 1.05 |
| Pound Sterling (£) | 0.87 | 0.74 |
| Japanese Yen (Y) | 184 | 156 |
| Swiss Franc (CHF) | 1.98 | 1.80 |
| Hong Kong Dollar (HK$) | 12.70 | 10.20 |

**21** How many more Swiss Francs could have been purchased with 3000 Euros in Year 1 compared to Year 2?

**Solution**

We calculate the number of Swiss Francs purchased with 3000 Euro for Year 1 and Year 2, and take the difference:

| | | |
|---|---|---|
| Swiss Francs bought Year 1 | = | 3,000 × 1.98 |
| | = | 5,940 |
| Swiss Francs bought Year 2 | = | 3,000 × 1.80 |
| | = | 5,400 |
| Difference | = | 5,940 – 5,400 |
| | = | 540 |

**Tip**

A faster way of calculating this value is to multiply the difference in exchange rates by 3,000:

| | | |
|---|---|---|
| Difference | = | 3,000 × (1.98 – 1.8) |
| | = | 540 |

**Answer**

| A | B | C | **D** | E |
|---|---|---|---|---|
| 435 Swiss Francs | 450 Swiss Francs | 485 Swiss Francs | **540 Swiss Francs** | 570 Swiss Francs |

## 22 In Year 1, 200 Euros was used to purchase a holding of Japanese Yen. What would the value of this holding be if exchanged for HK$ in Year 2?

**Solution**

We calculate the value of the holding in HK$ by calculating the value of the following exchanges:
200 EURO Year 1 -> Japanese Yen Year 1 -> Euro Year 2 -> Hong Kong Dollar Year 2.

Value of holding = 200 × 184 × (1 ÷ 156) × 10.20
= HK$ 2,406

**Answer**

| A | **B** | C | D | E |
|---|---|---|---|---|
| HK$ 2,313 | **HK$ 2,406** | HK$ 2,511 | HK$ 2,612 | HK$ 2,709 |

## 23 Which currency strengthened the least against the Euro between Year 1 and Year 2?

**Solution**

We calculate the proportional change for each currency and from this establish the currency that strengthened the least:

Proportional change = (Value Year 2 ÷ Value Year 1) – 1

| Currency | Proportional change |
|---|---|
| US Dollar | –0.18 |
| Pound Sterling | –0.15 |
| Japanese Yen | –0.15 |
| Swiss Franc | –0.09 |
| Hong Kong Dollar | –0.20 |

All of the currencies have appreciated against the Euro but the Swiss Franc has appreciated the least.

**Answer**

| A | B | C | **D** | E |
|---|---|---|---|---|
| US Dollar | Sterling | Yen | **Swiss Franc** | Hong Kong Dollar |

## 24 Between Year 1 and Year 2, the value of £ Sterling in relation to the Euro, moved:

### Solution

We calculate the change in value of the Pound Sterling in relation to the Euro from Year 1 to Year 2. We calculate this using:

Percentage change = {[(1/Year 2 Value) – (1/Year 1 Value)] ÷ (1/Year 1 Value)} × 100%
= {[(1/0.74) – (1/0.87)] ÷ (1/0.87)} × 100%
= 17.6%

### 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:

  Change of value of the shirt = [($2 – $1) ÷ $1] × 100%
  = 100%
- Conversely, the value of the Dollar has decreased 50% in relation to the shirt:

  Change of value of Pound Sterling = {[(1/$2) – (1/$1)] ÷ (1/$1)} × 100%
  = -50%
- We apply the same principle to calculate the change in value of the Pound Sterling in relation to the Euro by replacing the shirt with Euro and the Dollar with Pound Sterling.

### Answer

| A | B | C | D | **E** |
|---|---|---|---|---|
| Down 9.1% | Down 8.5% | Up 11.7% | Up 14.3% | **Up 17.6%** |