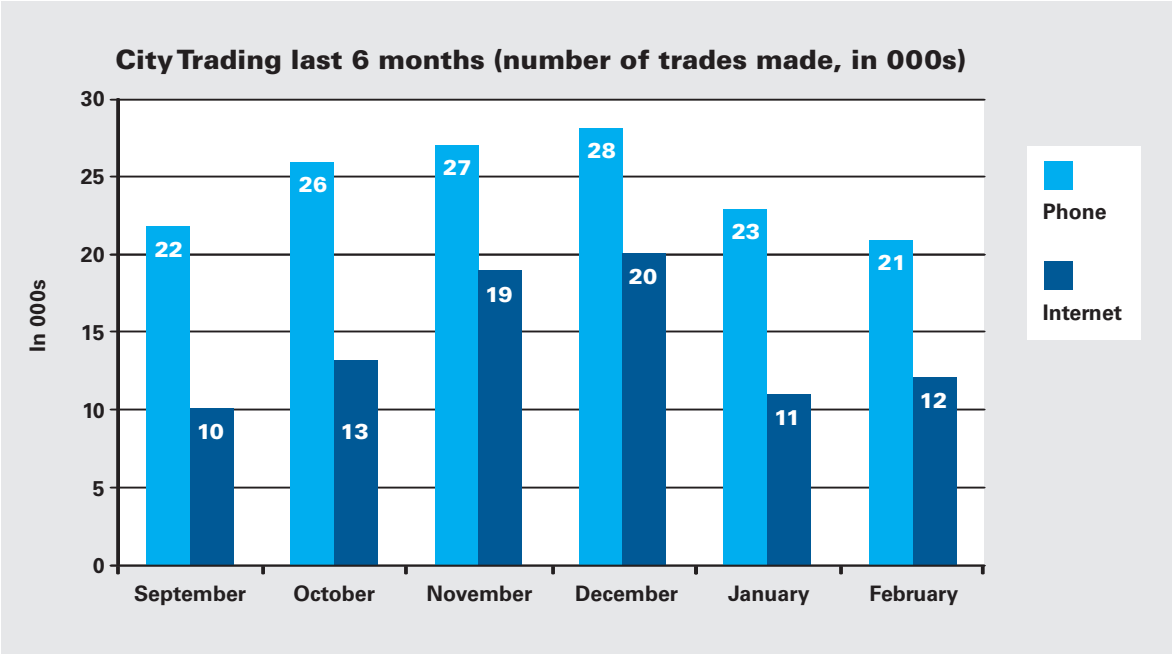
NUMERICAL TEST 1

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

Balanced Income Fund	
Holding	**Percentage**
Cash	7%
Property	10%
UK Gilts	13%
Corporate Bonds	14%
US T Bonds	17%
High Yield Equities	39%
TOTAL VALUE	**$130 million**

Note on Question 1 – Question 4

If we consider $100 million as 100%, the Total Fund Value will then be 130% or 1.3 times the percentage value. Thus the Total Fund Value of the Property holding will be 1.3 × 10 = 13, which is $13 million. This ratio (1.3 per percentage point) can be used to speed up the calculations.

1 Which of the following combinations of holdings has a value of $39 million?

Solution

We calculate what percentage of Total Fund Value amounts to $39 million. We then see which holdings' share add up to this value:

Percentage of Fund = (39÷130) × 100% = 30%

The holdings in UK Gilts and US T Bonds add up to 30%.

Tip

See note above Question 1 for an alternative way of approaching the problem.

Answer

A	B	C	D	**E**
Cash & UK Gilts	Corporate Bonds & High Yield Equities	Corporate Bonds & US T Bonds	High Yield Equities & Property	**UK Gilts & US T Bonds**

2 By how much does the value of the holdings in High Yield Equities and US T Bonds exceed that of the value of all the other holdings combined?

Solution

We need to calculate the percentage difference between the High Yield Equities/ US T Bonds holdings and all the other holdings combined. We then calculate the value of $130 million equivalent to this percentage:

Difference in percentage values = 39 + 17 – 14 – 13 – 10 – 7
= 12%

Value equivalent to 12% (working in $ millions) = 130 × 12%
= 15.6

Tip

See note above Question 1 for an alternative way of approaching the problem.

Answer

A	B	C	D	E
$15.6 million	$17.7 million	$19.8 million	$21.4 million	$22.6 million

3 What is the value of the Fund not invested in Cash?

Solution

We calculate what percentage of the Fund is not invested in cash and then calculate the equivalent value in dollars (working in $ millions):

Percentage of Fund not invested in Cash	=	100% – 7%
	=	93%
Value of Fund not invested in Cash	=	130 × 93%
	=	120.9

Tip

See the note above Question 1 for an alternative way of approaching the problems.

Answer

A	B	C	D	**E**
$106.6 million	$109.4 million	$116.7 million	$118.4 million	**$120.9 million**

4 Last year, the value of the High Yield Equities holding was 10% less than what it is now. What was the value of the High Yield Equities holding last year?

Solution

We calculate the value of the High Yield Equities holding and then calculate 90% of this to reach the answer (working in $ millions):

Value of High Yield Equities holding	=	39% × 130
	=	50.7
90% of Value	=	90% × 50.7
	=	45.63

Tip

See the note above Question 1 for an alternative way of approaching the problems.

Answer

A	B	**C**	D	E
$42.17 million	$43.03 million	**$45.63 million**	$46.09 million	$47.11 million

"Fin-Trader"; Salesperson travel expenses so far for this year				
Sales person	Average cost per journey ($)	Budgeted Annual Spend ($)	Actual Spend ($) (Jan-March)	Actual Spend ($) (April-June)
A	24	8,832	1,872	1,968
B	25	7,450	1,975	1,425
C	26	9,880	1,924	2,340
D	32	9,472	2,400	2,112
E	28	11,088	2,716	2,772
F	35	11,760	3,605	2,730

5 How many journeys has Salesperson D made between January and June?

Solution

Considering Salesperson D, we add the "Actual Spend" values and divide by the "Average cost per journey" to find the answer:

Number of Journeys = (2,400 + 2,112) ÷ 32 = 141

Answer

A	B	**C**	D	E
126	137	**141**	145	149

6 Which salesperson has been budgeted to make the most journeys this year?

Solution

For each salesperson we divide the "Budgeted Annual Spend" by the "Average cost per journey" to calculate the number of budgeted journeys per salesperson:

Salesperson	Number of budgeted journeys
A	368
B	298
C	380
D	296
E	396
F	336

From these calculations we can see that Salesperson E has been budgeted to make the most journeys for the year.

Tip

- Before starting any calculations, we look for the records which will provide us with the greatest ratio between "Average cost per journey" and "Budgeted Annual Spend".
- Salespersons A, C and E all seem as if they will have the greater ratios.
- Between Salesperson A and C we have a $2 dollar difference in "Average cost per journey" but roughly $1,000 in "Budgeted Annual Spend" so Salesperson C will have a greater ratio.
- This leaves Salespersons C and E. Once again there is a $2 difference in "Average cost per journey" but roughly $1200 difference in "Budgeted Annual Spend".
- Salesperson E has the greater ratio.

Answer:

A	B	C	D	**E**
Salesperson A	Salesperson B	Salesperson C	Salesperson D	**Salesperson E**

7 What is the maximum number of journeys that could be made in the rest of the year by Salesperson B, without exceeding their annual budgeted spend?

Solution

Considering Salesperson B, we subtract the "Actual Spend" from the "Budgeted Annual Spend" and divide by the "Average cost per journey":

Number of journeys = (7,450 – (1,975 + 1,425)) ÷ 25 = 162

Answer

A	B	C	**D**	E
148	152	158	**162**	166

8 Next year, Salesperson C plans to make 36 sales visits per month, at the same average cost as this year. By what percentage would the annual budget for this salesperson have to increase?

Solution

Considering Salesperson C, we first calculate the Annual Budget for the following year and then the percentage increase this represents.

We calculate the Annual Budget for the following year by multiplying the "Average cost per trip" by the number of trips per year:

Annual Budget = 26 × 36 × 12 = 11,232

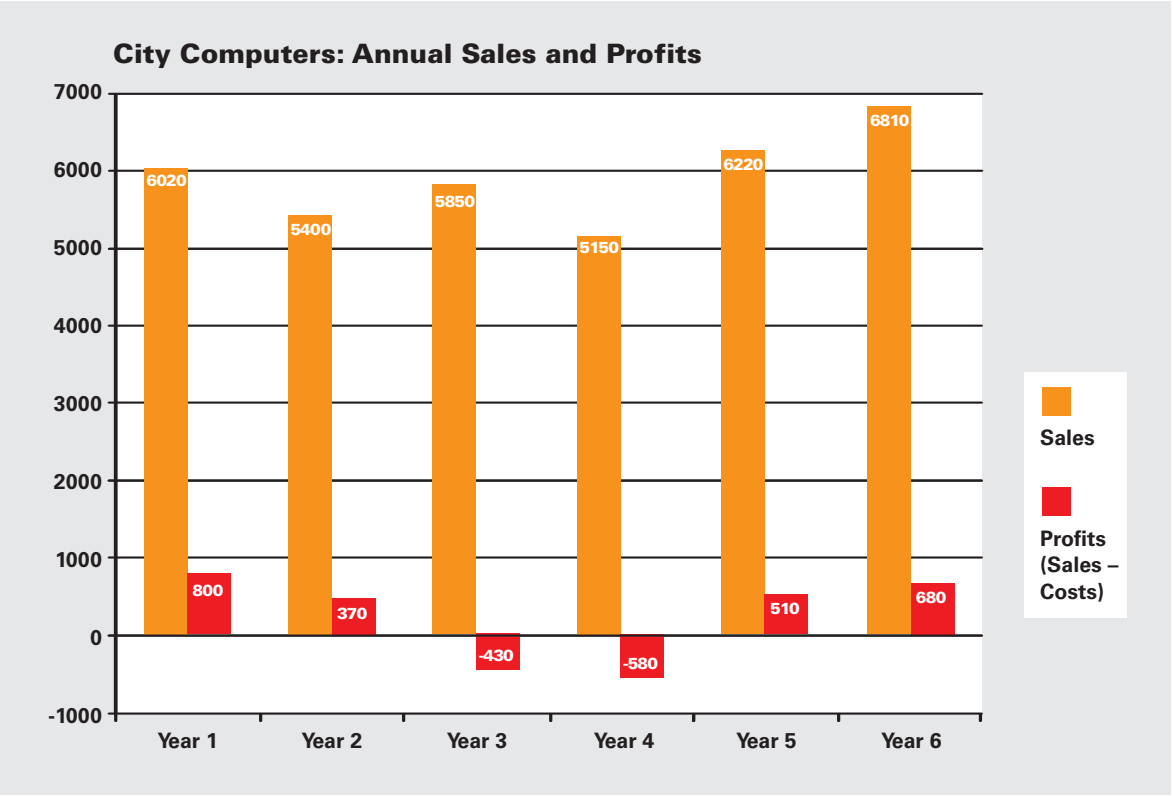
Now we calculate the percentage increase over this year's Annual Budget that this value represents:

Percentage increase = ((11,232 ÷ 9,880) – 1) × 100 = 13.68%

The answer closest to this value is 13.7%.

Answer

A	**B**	C	D	E
11.4%	**13.7%**	16.1%	18.4%	22.3%



9 What were the average annual profits over the 6-year period?

Solution

We need to add up the profit values for each year and divide by the number of years (working in $000s):

Average annual profit = (800 + 370 + (-430) + (–580) + 510 + 680) ÷ 6
= 225

Answer

A	B	C	D	E
$225,000	$235,000	$320,000	$442,000	$562,000

10 By how much did the Total Costs in Year 3 exceed those in Year 4?

Solution

We need to calculate the difference between Total Sales and Total Costs for Year 3 and Year 4.
We calculate the Total Costs per year by calculating Total Sales minus Total Profits (working in $000s):

Difference in Total Costs = Difference in Total Sales – Difference in Total Profits
= (Year 3 Sales – Year 4 Sales) – (Year 3 Profits – Year 4 Profits)
= 5,850 – 5,150 – ((–430) – (–580))
= 5,850 – 5,150 + 430 – 580
= 550

Answer

A	B	C	**D**	E
$460,000	$485,000	$505,000	**$550,000**	$620,000

11 In which year did Total Costs equal approximately 93% of Total Sales?

Solution

For each year we need to calculate the Total Costs and then what percentage this values is of the Total Sales:

Total Costs = Total Sales – Total Profits

Year	Total Costs	Percentage of Total Sales
1	5,220	86.7%
2	5,030	93.1%
3	6,280	107.4%
4	5,730	111.3%
5	5,710	91.8%
6	6,130	90%

From this table we can see the Year 2 Total Costs is approximately 93% of Total Sales.

Tip

- From the graph we can see that Total Costs for Year 3 and Year 4 exceeds Total Sales (or > 100% of Total Sales) which means we can ignore these years as the question refers to a decrease from Total Sales to Total Costs.
- Also, the possible answers provided eliminate Year 6 as an answer – even if Year 6 was not ruled out, looking at Year 6 we see Total Profits is roughly 10% of Total sales; indicating Total Costs will be 90% of Total Sales and not 93%.
- We now have only 3 possible answers: Year 1, Year 2 or Year 5.
- Looking at Year 1 we can see that Total Profits is greater than 10% of Total Sales, thus Total Costs will be less than 90% of Total Sales, ruling out Year 1 as an answer.
- Using a calculator we can quickly calculate which of Year 2 and Year 5 would be the correct Year. To calculate this, calculate what percentage of Total Sales Total Profits comprises. We are looking for about 7%:

  Year 2: (370÷5400) = 0.0685 or 6.85%

  Year 5: (510÷6220) = 0.082 or 8.2%

  The value for Year 2 is closer to 7%, making Year 2 the correct answer.

Answer:

A	**B**	C	D	E
Year 1	**Year 2**	Year 3	Year 4	Year 5

12 In Year 1, compared to the previous year, both Total Sales and Total Profits rose by 15% each. What approximately were the Total Costs in the year prior to Year 1?

Solution

We know that:

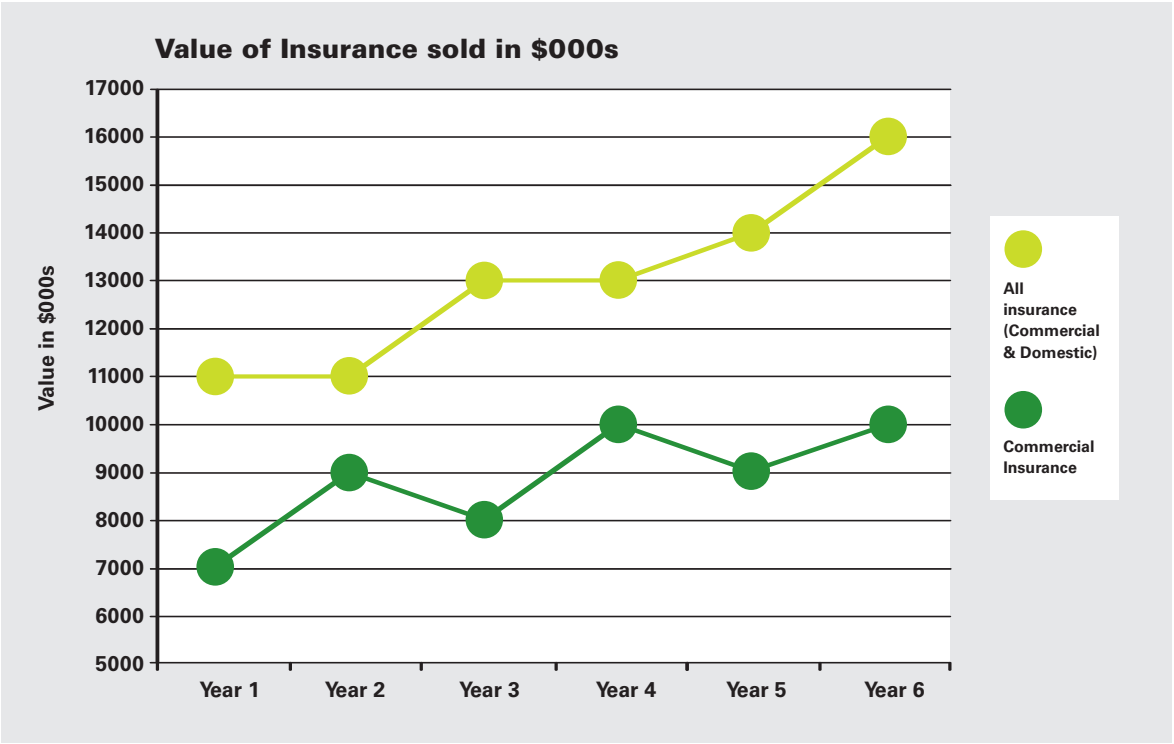
Total Costs = Total Sales – Total Profits

So, if both Total Sales and Total Costs have increased 15% compared to the previous year we calculate the Total Costs for the previous year using (working in $000s):

Total Costs previous year = (Total Sales × (1÷115%)) – (Total Profits × (1÷115%))
= (Total Sales – Total Profits) × (1÷115%)
= (6,020 – 800) × 86.96%
= 4,539.13

Answer

A	B	C	D	E
$4,539,130	$4,696,000	$4,728,340	$4,982,000	$5,100,780



13 What was the total value of domestic insurance sold in Years 3, 4 and 5 combined?

Solution

We calculate the value of Domestic Insurance for each year using:

Domestic Insurance = All Insurance – Commercial Insurance

As we need to calculate the total value of Domestic Insurance for the 3 years combined, we use, combining all 3 years (working in $ millions):

Total Domestic Insurance = Total Insurance – Total Commercial Insurance
= (13 + 13 + 14) – (8 + 10 + 9)
= 13

Answer

A	B	C	D	E
$13 million	$14 million	$15 million	$16 million	$19 million

14 What was the average value of commercial insurance sold per annum over the 6-year period?

Solution

We calculate the average value of Commercial Insurance using (working in $ millions):

Average value = Total value of Commercial Insurance sold over the 6 years ÷ Number of years
= (7 + 9 + 8 + 10 + 9 + 10) ÷ 6
= 8.83

Answer

A	B	**C**	D	E
$6.33 million	$7.83 million	**$8.83 million**	$9.53 million	$10.63 million

15 The biggest proportional increase in the sales of domestic insurance took place between which two years?

Solution

We need to calculate the Domestic Insurance for each year and from these values we calculate the proportional increase between years.

For each year we calculate the Domestic Insurance for each year:

Domestic Insurance = All insurance – Commercial Insurance

Year	Domestic Insurance (in $ millions)
1	4
2	2
3	5
4	3
5	5
6	6

The proportional increase we use (between Year 1 and Year 2):

Proportional Increase in Domestic Insurance between Year 1 and Year 2

= (Domestic Insurance Year 2 – Domestic Insurance Year 1) ÷ Domestic Insurance Year 2

= (2 – 4) ÷ 4

= -0.5

Between	Proportional Increase
Year 1 – Year 2	–0.5
Year 2 – Year 3	1.5
Year 3 – Year 4	–0.4
Year 4 – Year 5	0.67
Year 5 – Year 6	0.2

From this table we can see that the greatest proportional increase in Domestic Insurance is between Year 2 and Year 3.

Tip

- Looking at the graph we can ignore all changes between years where the Commercial Insurance value increases and the All Insurance value stays the same, as we know this is equivalent to a decrease in Domestic Insurance.
- So the periods between Year 1 to Year 2 and Year 3 to Year 4 can be ignored.
- From the graph we now consider the remaining time periods. Looking at the change in difference between All Insurance and Commercial Insurance we can see (read from the graph) that the changes in difference are:
  - Year 2 – Year 3: from $2 million to $5 million
  - Year 4 – Year 5: from $3 million to $5 million
  - Year 5 – Year 6: from $5 million to $6 million
- From this we see the greatest increase is from Year 2 – Year 3.

Answer:

A	**B**	C	D	E
Year 1 and Year 2	**Year 2 and Year 3**	Year 3 and Year 4	Year 45 and Year 5	Year 5 and Year 6

16 If in Year 7 the value of commercial insurance sold were to increase by 15% and the value of domestic insurance sold were to increase by 10%, what would the total value of insurance sold be?

Solution

We need to calculate the Year 7 values for both the Commercial and Domestic insurance using the increase indicated in the question (in $ millions):

Year 7:

Commercial Insurance	=	10 × 115%	=	11.5
Domestic Insurance	=	(16 – 10) × 110%	=	6.6

From this we get the total value of insurance for Year 7 by adding these two values.

Total Insurance	=	11.5 + 6.6	=	18.1

Answer

A	B	C	D	**E**
$16.7 million	$16.9 million	$17.2 million	$17.8 million	**$18.1 million**

17 Which Fund has shown the greatest relative change in value between Year 1 and Year 3?

Solution

We calculate the relative change between Year 1 and Year 3 for each fund. The fund with the largest relative change will be the answer.

Relative change = (Year 3 Value – Year 1 Value) ÷ Year 1 Value

Fund	Relative change
A	0.48
B	0.57
C	–0.31
D	0.21
E	–0.38

From this we can see Fund B has the greatest relative change.

Tip

- From the graph we can see that the most likely funds would be A, B or E.
- We include all the funds as the question stated greatest relative change and did not specify only increasing or decreasing.
- We now look for the fund with the largest difference between Year 1 and Year 3, and the smallest value for Year 1.
- Fund B is the fund that matches these criteria the best.

Answer

A	**B**	C	D	E
Fund A	**Fund B**	Fund C	Fund D	Fund E

18 If the percentage fall in the value of Fund D between Year 2 and 3 is repeated between Year 3 and Year 4, what will the value of the Fund be in Year 4?

Solution

First we calculate the percentage fall in value of Fund D between Year 2 and 3 (working in $ millions):

Percentage change = (145 – 185) ÷ 185 = –0.216 or -21.6%

Now we calculate the value of the fund for Year 4 (working in $ millions):

Value of fund = 145 × (1 – 0.216) = 113.6

Answer

A	B	C	**D**	E
$110.6 million	$111.2 million	$112.3 million	**$113.6 million**	$115.5 million

19 In Year 3, half of the value of the gain made in Fund A was derived from monies that had been transferred from Fund C. What would the value of Fund C have been in Year 3 had this transfer not taken place?

Solution

First we calculate the value of the gain in Fund A (working in $ millions):

Gain = 215 – 180 = 35

Now we add half this gain to the value of Fund C in Year 3 (working in $ millions):

Value of Fund C = 90 + (35 ÷ 2) = 107.5

Answer

A	**B**	C	D	E
$106.5 million	**$107.5 million**	$109.0 million	$110.5 million	$112.5 million

20 In proportional terms, which Fund has seen the most consistent rate of change on a year-to-year basis?

Solution

First we calculate the proportional change for each fund over the 3 years:

Fund	Year 1 – Year 2	Year 2 – Year 3
A	1.24	1.19
B	1.3	1.21
C	1.31	0.53
D	1.54	0.78
E	0.8	0.78

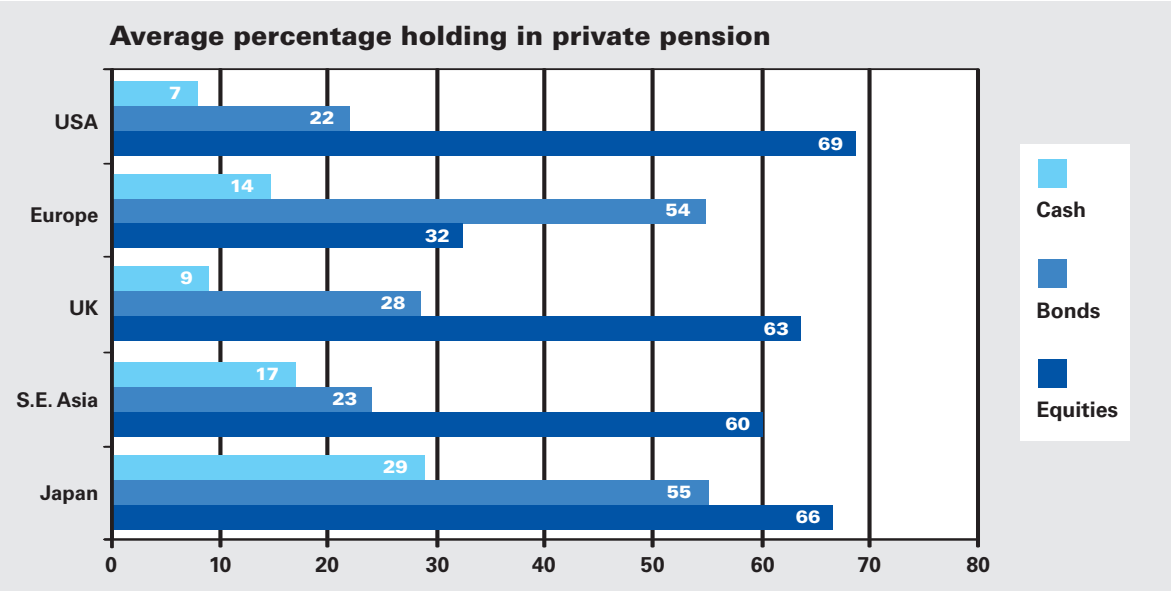
From this table we can see that Fund E has the most consistent rate of change.

Tip

- Looking at the graph we can cancel Fund C and Fund D as possible answers as the rates of change for both are erratic.
- Fund B has decreasing changes in value whilst the actual fund values increase which would indicate a decreasing sequence of proportions, making Fund B highly unlikely as the answer.
- This leaves us with Fund A and Fund E. Fund E looks like the most likely candidate as the changes in value are decreasing as the actual fund values decreases.
- We calculate the proportional rate of change for Fund E first and only if this does not look sufficiently consistent (or to do a spot check) do we calculate the proportional rate of change for Fund A (and then the rest if it still doesn't look right).

Answer

A	B	C	D	**E**
Fund A	Fund B	Fund C	Fund D	**Fund E**



Location	USA	Europe	UK	S. E. Asia	Japan
Average Value in US $	343,000	284,000	235,000	102,000	257,000

21 By how much does the value of bonds in an average private pension held in Japan exceed that of bonds held in a UK private pension?

Solution

First we calculate the value of bonds held in an average private pension fund in Japan and the UK (working in $000s):

Japan: Value of bonds = 55% × 257 = 141.35

UK: Value of bonds = 28% × 235 = 65.8

Subtracting, we get:

Difference in value of bonds = 75.55

Tip

- To speed up this calculation we can assign a dollar value to each percentage point per country. So, for Japan, a percentage point would have a value of $2,570 and for UK, a percentage point would have a value of $2,350.
- We then only need to multiply these values with the relevant percentages; for example, the value of the UK bond holding would be 28 × $2,350 = $65,800.

Answer

A	**B**	C	D	E
$74,450	**$75,550**	$76,500	$77,550	$78,000

22 Which of these five private pensions has the smallest actual holding of equities?

Solution

First we calculate the value of the equities holding for each country:

Location	Value of equities holding
USA	236,670
Europe	90,880
UK	148,050
S. E. Asia	61,200
Japan	41,120

From this table we can see that Japan has the smallest actual holding of equities.

Tip

- As we noted in Question 21, if we assign a dollar value to each percentage point for each country, we can make a much faster comparison before doing any calculations.
- Using this dollar value we can immediately see that USA, UK and Europe are not going to be the answer. This leaves us with 2 locations.
- The confusing location is S. E. Asia as this has a large percentage of its total holdings in equities.
- However, looking at the dollar value per percentage point, we can see that the dollar value per percentage point in S. E Asia is roughly equal to 40% (1,020 ÷ 2,570) that of Japan.
- So the S. E. Asia holding in equities is only 24% (40% of 60%) in terms of Japan percentage point dollar values.
- This is still greater than Japan's holding of 16%. Japan will have the smallest actual holding.

Answer

A	B	C	D	**E**
USA	Europe	UK	S.E. Asia	**Japan**

23 If next year the average value of the UK private pension were to increase by $15,000, and the value of equities held in it were increased to reflect the percentage held in the average USA private pension, what would the value of equities held in a UK private pension then be?

Solution

We can see that the average value for the UK private pension will increase to:

Next year's average value = 235,000 + 15,000 = 250,000

We now calculate 69% of this new average value:

Value of equities held = 69% × 250,000 = 172,500

Answer

A	B	C	**D**	E
$159,650	$162,350	$168,550	**$172,500**	$182,550

24 In the average European private pension, it is predicted that 10% of the holdings in bonds will be switched into holdings in equities year on year. All other things being equal, after how many years will the holdings in equities exceed those of bonds?

Solution

First we calculate the value of the bonds holding and the equities holding:

Value of bonds holding	=	284,000 × 54%	=	153,360
Value of equities holding	=	284,000 × 32%	=	90,880

Now we calculate the successive amounts (equivalent to 10% of bonds holding) to be switched from bonds to equities. We also subtract these values from bonds and add to equities in order to check when the equities value e ceeds the value of bonds:

Year 1:

Value to switch	=	10% × 153,360	=	15,336
New value for bonds	=	153,360 – 15,336	=	138,024
New value for equities	=	90,880 + 15,336	=	106,216

Year 2:

Value to switch	=	10% × 138,024	=	13,802
New value for bonds	=	153,360 – 13,802	=	124,222
New value for equities	=	106,216 + 13,802	=	120,018

We can see that the difference between the value of bonds and the value of equities is roughly 4,200 which is much less than 10% × 124,222 = 12,422. From this we can see that the equities holding will exceed the bond holding after the next year.

Thus three years is the answer.

Tip

- An alternative (and faster) way of calculating the number of years is:
- We are looking for the number of years after which the value of the Bonds holding is less than half the value of the combined value of Bonds and Equities.

  Thus:

  Number of years after which value bonds < (153,360 + 90,880) ÷ 2
  < 122,120
- We know that we are considering a compound decrease year on year, so we rewrite this condition as:

  153,360 × (0.9^t) < 122,120 ("^" means "to the power")

We solve for t:

0.9^t	<	0.7963
t ln(0.9)	<	ln(0.7963)
t	<	2.16 years

Since we are working in integer values, we round this up to 3 years as we need number of years greater than 2.

Answer

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