Topic Test: Depreciation

Remember: these are HSC-type questions.

Part A   (Suggested time: 15 minutes)

Choose the correct answer (A, B, C or D)

for each question.   One mark each

1. A machine was bought for $40 000 four years ago. It will be depreciated by either the declining-balance method at 10% p.a. or the straight-line method with the depreciation per period being $3439. Which method of depreciation would give it a greater value now?
A declining-balance method
B straight-line method
C both methods give the same value
D there is not enough information

2. A mower is being depreciated using the straight-line method. If it was bought for $5400 six years ago and is currently valued at $2640, find the amount of depreciation allowed per year.
A $430   B $440
C $450   D $460

3. An asset originally valued at $22 500 is depreciated using the declining-balance method. The rate of depreciation is 12% p.a. By how much (to the nearest dollar) has the asset depreciated after five years?
A $11 874   B $10 626
C $13 500   D $9000

4. A chainsaw was purchased for $1080 and its current value is $600. If it has been depreciating by $120 per year, how old is the saw?
A 4 years   B 5 years
C 6 years   D none of these

5. A welder was bought for $2400 and is being depreciated by the declining-balance method at 8% p.a. After how many years will its value be first less than half the purchase price?
A 6   B 7
C 8   D 9

6. The graph shows the value of a van over the first ten years.

Value of van
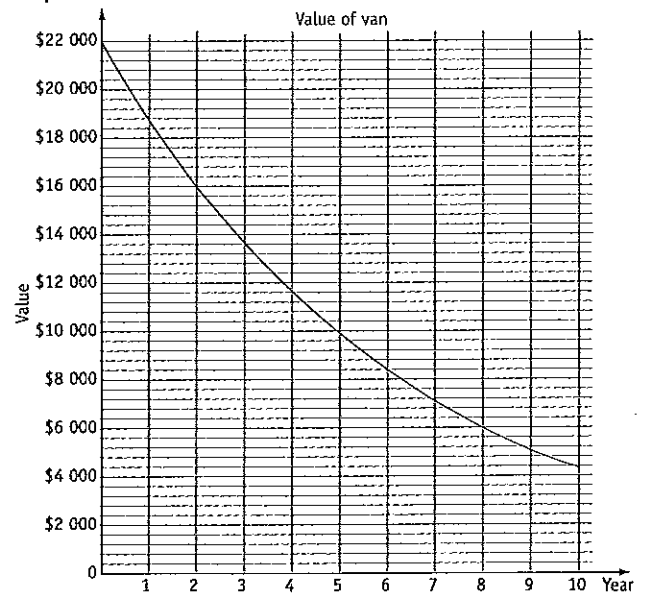
During which year did its value fall by $2000?
A 3rd   B 4th
C 5th   D 6th

7. Some furniture has been depreciated by the straight-line method at $700 per year. If the furniture is now seven years old and is valued at $1380, what was its original value?
A $6280   B $6980
C $8980   D $10 360

8. A factory owner purchased a machine for $3650 on 27/05/2007. The machine is to be depreciated using the straight-line method with the amount of depreciation allowed per year to be 10% of the machine's original value. How much depreciation can be claimed during the financial year ending 30/06/07?
A $35   B $36.50
C $330   D $365

9 The table shows the value and rate of depreciation for some of the items belonging to a business. All of the items are being depreciated using the declining-balance method at different rates.

Item	Beg. value	Depr. rate
Pruner	$1 450	22.5%
Mower	$10 500	8%
Slasher	$7 645	12%
Mulcher	$4 290	20%

Which item will depreciate by the greatest amount this year?

A pruner   B mower
C slasher   D mulcher

10 A car is depreciating using the declining-balance method at 15% p.a. The original value was $35 000. What percentage of the original value is the car worth after three years?

A 39%   B 45%
C 55%   D 61%

Part B

(Suggested time: 25 minutes)

Show all working.   15 marks

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11 A lawn tractor was bought for $5400 and is depreciating using the straight-line method.
  a The amount of depreciation allowed in the first year is $8\frac{1}{3}\%$ of the purchase price. Find this amount.   1 mark
  b Find the value of the lawn tractor after three years.   1 mark
  c After how many years will the lawn tractor be worthless?   1 mark

12 A machine was bought for $38 000 and is being depreciated by the declining-balance method.
  a After one year the value of the machine has reduced to $34 960. What is the rate of depreciation?   1 mark
  b After how many years will the value of the machine fall below $10 000?   2 marks

13 Some office furniture was bought for $7600.
  a If it is depreciated using the declining-balance method at 10% p.a., find its value after ten years to the nearest dollar.   1 mark
  b If the value of the furniture would be the same after ten years if the straight-line method of depreciation was used, find the amount of depreciation allowed per year.   1 mark
  c Draw a rough sketch showing the value of the furniture over the first twelve years under both methods.   2 marks

14 The table shows the values and depreciation rate of items for taxation purposes.

	Computers	Office equipment	Van
Beginning value	$8970	$4215	$13 500
Depreciation type	Straight-line	Straight-line	Declining-balance
Rate/amount	$1974 p.a.	$820 p.a.	15% p.a.
Depreciation			
Final value			

  a What will be the beginning value of the computers next year?   1 mark
  b What is the total amount of depreciation that can be claimed this year?   2 marks

15 A truck was purchased for $81 000 and is being depreciated using the declining-balance method at 16% p.a. Find the amount the truck depreciates in the sixth year.   2 marks

Solutions

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1 Straight-line method:
$$S = V_0 - Dn$$
$$= \$40\,000 - \$3439 \times 4$$
$$= \$26\,244$$
Declining-balance method:
$$S = V_0(1-r)^n$$
$$= \$40\,000(1 - 0.1)^4$$
$$= \$26\,244$$
Both methods give the same value.   C

2 $V_0 = \$5400$, $S = \$2640$, $n = 6$
$$S = V_0 - Dn$$
$$\$2640 = \$5400 - D \times 6$$
$$6D = \$5400 - \$2640$$
$$= \$2760$$
$$D = \$460 \qquad\qquad D$$

3 $V_0 = \$22\,500$, $r = 0.12$, $n = 5$
$$S = V_0(1-r)^n$$
$$= \$22\,500(1 - 0.12)^5$$
$$= \$11\,874 \quad \text{(nearest dollar)}$$
Total depreciation $= \$22\,500 - \$11\,874$
$$= \$10\,626 \qquad B$$

4 $V_0 = \$1080$, $S = \$600$, $D = \$120$
$$S = V_0 - Dn$$
$$\$600 = \$1080 - \$120 \times n$$
$$\$120n = \$1080 - \$600$$
$$= \$480$$
$$n = 4 \qquad\qquad A$$

5 $V_0 = \$2400$, $S = \$1200$, $r = 0.08$
$$S = V_0(1-r)^n$$
$$\$1200 = \$2400(1 - 0.08)^n$$
$$0.5 = (0.92)^n$$
$$n = 9 \qquad\qquad D$$

6 In the 4th year.   B

7 $S = \$1380$, $D = \$700$, $n = 7$
$$S = V_0 - Dn$$
$$\$1380 = V_0 - \$700 \times 7$$
$$\$1380 = V_0 - \$4900$$
$$V_0 = \$1380 + \$4900$$
$$= \$6280 \qquad A$$

8 Depreciation per year $= 10\%$ of \$3650
$$= \$365$$
$$[\$1 \text{ per day}]$$
From 27th of May to 30th of June
$$= 35 \text{ days}$$
Depreciation is \$35.   A

9 Pruner: Depreciation $= 0.225 \times \$1450$
$$= \$326.25$$
Mower: Depreciation $= 0.08 \times \$10500$
$$= \$840$$
Slasher: Depreciation $= 0.12 \times \$7645$
$$= \$917.40$$
Mulcher: Depreciation $= 0.2 \times \$4290$
$$= \$858$$
The slasher has the greatest depreciation.   C

10 $V_0 = \$35\,000$, $r = 0.15$, $n = 3$
$$S = V_0(1-r)^n$$
$$= \$35\,000(1 - 0.15)^3$$
$$= \$21\,494 \quad \text{(nearest dollar)}$$
Percentage of original value
$$= \frac{\$21\,494}{\$35\,000} \times 100\%$$
$$= 61\% \quad \text{(nearest percent)} \qquad D$$

11 **a** Depreciation per year
$$= 8\tfrac{1}{3}\% \text{ of } \$5400$$
$$= \$450 \qquad \checkmark$$

b $V_0 = \$5400$, $D = \$450$, $n = 3$
$$S = V_0 - Dn$$
$$= \$5400 - \$450 \times 3$$
$$= \$4050 \qquad \checkmark$$

c Tractor is worthless when $S = 0$.
$$0 = \$5400 - \$450 \times n$$
$$\$450n = \$5400$$
$$n = 12$$
The lawn tractor will be worthless after 12 years. $\checkmark$

12 **a** Amount of depreciation
$$= \$38\,000 - \$34\,960$$
$$= \$3040$$
Rate of depreciation
$$= \frac{\$3040}{\$38\,000} \times 100\%$$
$$= 8\%$$
The rate of depreciation is 8% p.a. $\checkmark$

b
$$S = V_0(1-r)^n$$
$$\$10\,000 = \$38\,000(1 - 0.08)^n \qquad \checkmark$$
When $n = 16$,
$$\$38\,000(1 - 0.08)^n = 10\,008.957\,25 \ldots$$
When $n = 17$,
$$\$38\,000(1 - 0.08)^n = 9208.240\,667 \ldots$$
The value falls below \$10 000 after 17 years. $\checkmark$

13 $V_0 = \$7600$

a $r = 0.1$, $n = 10$
$$S = V_0(1-r)^n$$
$$= \$7600(1 - 0.1)^{10}$$
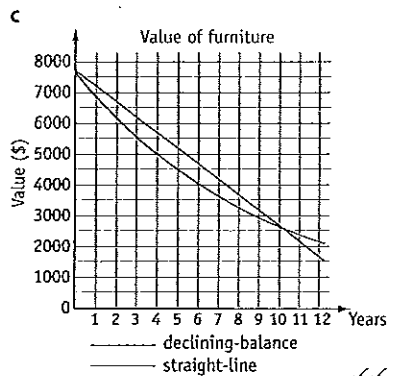$$= \$2649.956\,145 \ldots$$
$$= \$2650 \quad \text{(nearest dollar)} \qquad \checkmark$$

b
$$S = V_0 - Dn$$
$$\$2650 = \$7600 - D \times 10$$
$$10D = \$7600 - \$2650$$
$$= \$4950$$
$$D = \$495 \qquad \checkmark$$

c

Value of furniture

----- declining-balance
—— straight-line $\checkmark\checkmark$

14 **a** Computers depreciate by \$1974 per year.
Beginning value next year
$$= \$8970 - \$1974$$
$$= \$6996 \qquad \checkmark$$

b Depreciation of van
$$= 15\% \text{ of } \$13\,500$$
$$= 0.15 \times \$13\,500$$
$$= \$2025 \qquad \checkmark$$
Total depreciation
$$= \$1974 + \$820 + \$2025$$
$$= \$4819 \qquad \checkmark$$

15 $V_0 = \$81\,000$, $r = 0.16$, $n = 5$
$$S = V_0(1-r)^n$$
$$= \$81\,000(1 - 0.16)^5$$
$$= \$33\,875 \quad \text{(nearest dollar)} \qquad \checkmark$$
Depreciation in the sixth year
$$= 0.16 \times \$33\,875$$
$$= \$5420 \qquad \checkmark$$