

FINANSIES, GROEI EN VERVAL

Oplossings

Die DBE se eie nasienriglyne, in boekvolgorde

Elke oplossing hier is 'n uitknipsel van die amptelike DBE-nasienriglyn wat saam met die vraestel gepubliseer is waaruit die vraag kom. Die bewerking, die punt-merke en die aanvaarde alternatiewe is die DBE se eie. Niks is oorgeskryf of oor afgelei nie.

Die nommers pas by die vraeboek: oplossing 34 antwoord vraag 34, en die hoofstukke is in dieselfde volgorde.

Die DBE skryf een riglyn vir albei tale, so hierdie bladsye is tweetalig en hul nasienaantekeninge is grootliks in Engels. Dit is die DBE se eie bladsy, presies soos gedruk weergegee.

'n Nasienriglyn word vir nasieners geskryf, nie vir leerders nie. Dit wys die kortste pad na die punte, so waar 'n stap saamgepers lyk, is dit die riglyn wat bondig is eerder as 'n stap wat ontbreek.

1. Vind die koers uit vier jaar se groei, dan 'n maandelikse spaarplan

Amptelike DBE-nasienriglyn · Mei/Junie 2021 · V7 · 13 punte

QUESTION/VRAAG 7

7.1	$13\,080 = 10\,000 \left(1 + \frac{i}{4}\right)^{16}$ $\left(1 + \frac{i}{4}\right)^{16} = \frac{13080}{10000}$ $1 + \frac{i}{4} = \sqrt[16]{\frac{13080}{10000}}$ $\frac{i}{4} = 0,0169227...$ $i = 0,06769...$ $i = 6,77\%$	✓ substitution into correct formula ✓ $n = 16$ ✓ simplification ✓ answer (A) (4)
7.2.1	$F = \frac{x[(1+i)^n - 1]}{i}$ $F = \frac{9\,000 \left[\left(1 + \frac{0,075}{12}\right)^{60} - 1 \right]}{\frac{0,075}{12}}$ $F = R\,652\,743,95$	✓ $\frac{0,075}{12}$ ✓ substitution into correct Formula ✓ answer (3)
7.2.2	$60 \times 9000 = R540\,000$ $A = P(1+i)^n$ $652\,743,95 \left(1 + \frac{0,075}{12}\right)^n = 190\,214,14 + 540\,000$ $730\,214,14 = 652\,743,95 \left(1 + \frac{0,075}{12}\right)^n$ $1,1186.... = (1,00625)^n$ $n = \log_{1,00625}(1,1186)$ $\therefore n = 18 \text{ months}$	✓ $60 \times 9000 = R540\,000$ ✓✓ equation ✓ simplification ✓ use of logs ✓ 18 months (6)

	OR/OF Interest over 5 years = $652\,743,95 - 9\,000 \times 60$ $= 112\,743,95$ $\therefore$ interest on n years $= 190\,214,14 - 112\,743,95 = 77\,470,19$ $652\,743,95 + 77\,470,19 = 652\,743,95 \left(1 + \frac{0,075}{12}\right)^n$ $1,1186\dots = (1,00625)^n$ $n = \log_{1,00625}(1,1186)$ $\therefore n = 18$ months	OR/OF ✓ $60 \times 9\,000$ ✓ answer ✓ equating ✓ simplification ✓ use of logs ✓ 18 months (6)
		[13]

2. 'n Selfoon se waardeverminderingskoers, dan twee mense wat vir een vakansie spaar

Amptelike DBE-nasienriglyn · Mei/Junie 2024 · V7 · 13 punte

QUESTION 7/VRAAG 7

7.1	$A = P(1-i)^n$ $8\,337,75 = 13\,000(1-i)^6$ $i = 7,14\%$	✓ substitution in correct formula ✓✓ answer (3)
7.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $80\,000 = \frac{x \left[\left(1 + \frac{8,6}{1200}\right)^{36} - 1 \right]}{\frac{8,6}{1200}}$ $x = R1\,955,78$ Thandi's total = $1955,78 \times 36 = R\,70\,408,08$ Eric's total = $1402,31 \times 48 = R\,67\,310,88$ Difference = $70\,409,08 - 67\,310,88$ = R3 097,20	✓ i ✓ substitution into correct formula ✓ answer ✓ answer (4)
7.3	$A = P(1+i)^n$ $A = 225\,000 \left(1 + \frac{0,09}{12}\right)^3$ $A = R\,230\,100,5637\dots$ $225\,000 \left(1 + \frac{0,09}{12}\right)^3 = \frac{5500 \left[1 - \left(1 + \frac{0,09}{12}\right)^{-n} \right]}{\frac{0,09}{12}}$ $0,3137734959\dots = 1 - \left(1 + \frac{0,09}{12}\right)^{-n}$ $\left(1 + \frac{0,09}{12}\right)^{-n} = 0,6862265041\dots$ $-n = \log_{\left(1 + \frac{0,09}{12}\right)} 0,6862265041\dots$ $n = 50,394375\dots$ $n = 51$	✓ substitution in correct formula ✓ answer ✓ substitution ✓ simplification ✓ use of logs ✓ answer (6)
		[13]

3. Die effektiewe koers, dan om 'n inkomste uit 'n belegging te trek

Amptelike DBE-nasienriglyn · Mei/Junie 2025 · V7 · 13 punte

QUESTION/VRAAG 7

7.1	$(1+i) = \left(1 + \frac{15}{1200}\right)^{12}$ $i = 16,08\%$	✓ substitution into correct formula ✓ answer (2)
7.2	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $500\,000 = \frac{11\,250 \left[1 - \left(1 + \frac{0,06}{4}\right)^{-n}\right]}{\frac{0,06}{4}}$ $\frac{2}{3} = 1 - \left(1 + \frac{0,06}{4}\right)^{-n}$ $(1,015)^{-n} = \frac{1}{3}$ $-n = \log_{1,015}\left(\frac{1}{3}\right)$ $n = 73,788\dots$ $\therefore n = 73 \text{ withdrawals}$	✓ $i = \frac{0,06}{4}$ ✓ substitution into correct formula ✓ correct use of logs ✓ answer for n ✓ final answer (5)
7.3	$A = P(1+i)^n$ $= 12\,000 \left(1 + \frac{0,095}{12}\right)^{12 \times 4}$ $= R\,17\,521,17895\dots$ $F = \frac{x[(1+i)^n - 1]}{i}$ $F = \frac{500 \left[\left(1 + \frac{0,095}{12}\right)^{24} - 1\right]}{\frac{0,095}{12}}$ $= R\,13\,158,64744\dots$ $\text{Total} = 17\,521,17895\dots + 13\,158,64744\dots$ $= R\,30\,679,83$	✓ $i = \frac{0,095}{12}$ ✓ $n = 48$ in A ✓ substitution into correct formula ✓ $n = 24$ in F ✓ substitution into correct formula ✓ adding compound and future values (6)
		[13]

4. Die koers uit 24 maande se groei, dan 'n reeks maandelikse deposito's

Amptelike DBE-nasienriglyn · November 2022 · V6 · 14 punte

QUESTION 6/VRAAG 6

6.1	$A = P(1+i)^n$ $13\,459 = 12\,000 \left(1 + \frac{m}{400}\right)^8$ $\left(1 + \frac{m}{400}\right)^8 = 1,121\dots$ $1 + \frac{m}{400} = \sqrt[8]{1,121\dots}$ $\frac{m}{400} = 0,0144\dots$ $\therefore m = 5,78\%$	✓ 8 ✓ subst into correct formula ✓ $1 + \frac{m}{400} = \sqrt[8]{1,121\dots}$ ✓ 5,78 % (4)
6.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $F = \frac{1\,000 \left[\left(1 + \frac{0,075}{12}\right)^{12} - 1 \right]}{\frac{0,075}{12}}$ $= R12\,421,22$ He won't be able to buy the computer because $R13\,000 - R12\,421,22 = R578,78$ OR/OF He won't be able to buy the computer because $R12\,421,22 < R13\,000$	✓ $\frac{0,075}{12}$ ✓ 12 ✓ answer ✓ conclusion (4)
6.3.1	Loan amount = $85\% \times R250\,000$ $= R212\,500$ OR/OF Loan amount = $R250\,000 - (15\% \times R250\,000)$ $= R212\,500$	✓ answer (1) OR/OF ✓ answer (1)
6.3.2	$A = 212\,500 \left(1 + \frac{0,13}{12}\right)^5$ $A = 224\,262,53$ $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $224\,262,53 = \frac{x \left[1 - \left(1 + \frac{0,13}{12}\right)^{-67} \right]}{\frac{0,13}{12}}$ $\therefore x = R4\,724,96$	✓ $A = 212\,500 \left(1 + \frac{0,13}{12}\right)^5$ ✓ answer ✓ substitution into correct formula ✓ - 67 ✓ answer (5)
		[14]

5. Sestien jaar se saamgestelde groei, dan die koers wat 'n waarde halveer

Amptelike DBE-nasienriglyn · November 2024 · V7 · 14 punte

QUESTION/VRAAG 7

7.1	$A = P(1+i)^n$ $A = 5\,000 \left(1 + \frac{6,8}{400}\right)^{64}$ $= R\,14\,706,56$	✓ i, n ✓ substitution into correct formula ✓ answer (3)
7.2	$A = P(1-in)$ $\frac{1}{2}P = P(1-4i)$ $\frac{1}{2} = (1-4i)$ $i = \frac{1}{8}$ $\therefore r = 12,5\%$ OR/OF $r = \frac{50\%}{4}$ $r = 12,5\%$	✓ substitution into correct formula ✓ answer (2) OR/OF ✓ method ✓ answer (2)
7.3.1	Already paid: $2\,300,98 \times 60 = R\,138\,058,80$ Interest: $138\,058,80 - 100\,000 = R\,38\,058,80$	✓ amount already paid ✓ interest (2)

7.3.2

Balance after 2 years:

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$P = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-36} \right]}{\frac{13,5}{1200}}$$

$$= R\,67\,804,94$$

$$R\,67\,804,94 - R\,20\,000 = R\,47\,804,94$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$47\,804,94 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}}$$

$$0,766 = (1,01125)^{-n}$$

$$\log_{1,01125} 0,766 = -n$$

$$n = 23,83$$

∴ 12 months earlier

OR/OF

$$A = 100\,000 \left(1 + \frac{13,5}{1200} \right)^{12 \times 2}$$

$$= R\,130\,799,12$$

$$F = \frac{2\,300,98 \left[\left(1 + \frac{13,5}{1200} \right)^{12 \times 2} - 1 \right]}{\frac{13,5}{1200}}$$

$$= R\,62\,993,92$$

$$\text{Balance outstanding} = A - F = 130\,799,12 - 62\,993,92$$

$$= R\,67\,805,20$$

$$R\,67\,805,20 - R\,20\,000 = R\,47\,805,20$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$47\,805,20 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}}$$

$$0,766... = (1,01125)^{-n}$$

$$\log_{1,01125} 0,766... = -n$$

$$n = 23,80$$

∴ 12 months' earlier

✓ $n = 36$

✓ i

✓ substitution into correct formula

✓ answer

✓ answer

✓ substitution into correct formula

✓ answer in months (7)

OR/OF

✓ $n = 24$

✓ i

✓ substitution into both correct formulae

✓ answer

✓ answer

✓ substitution into correct formula

✓ answer in months (7)

	OK/OF $100\,000 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}} + 20\,000 \left(1 + \frac{13,5}{1200} \right)^{-24}$ $84\,709,38 = \frac{2\,300,98 \left[1 - \left(\frac{809}{800} \right)^{-n} \right]}{\frac{0,135}{12}}$ $0,4142 = 1 - \left(\frac{809}{800} \right)^{-n}$ $\left(\frac{809}{800} \right)^{-n} = 0,5858$ $-n = \log_{\left(\frac{809}{800} \right)} 0,5858$ $n = 47,80$ months after starting payments $\therefore$ 12 months earlier	OK/OF ✓ i ✓ $n = 24$ ✓ $= 100\,000$ ✓ substitution into correct P formula ✓ substitution into correct A formula ✓ simplification ✓ answer in months (7)
		[14]

6. Hoe lank 'n belegging neem om te verdubbel, dan masjinerie wat waarde verloor

Amptelike DBE-nasienriglyn · Mei/Junie 2022 · V7 · 15 punte

QUESTION 7

7.1	$A = P(1+i)^n$ $2 = 1\left(1 + \frac{0,085}{4}\right)^{4n}$ $4n = \log_{\left(1 + \frac{0,085}{4}\right)} 2$ $n = 8,24 \text{ years}$	$\checkmark 2$ $\checkmark \frac{0,085}{4}$ } In correct formula $\checkmark$ use of logs $\checkmark$ answer in years (4)
7.2.1	$A = P(1-i)^n$ $180\,000 = 500\,000(1-i)^5$ $\frac{9}{25} = (1-i)^5$ $\sqrt[5]{\frac{9}{25}} = 1-i$ $i = 0,1848068\dots$ $r = 18,48\%$	$\checkmark$ subs into correct formula $\checkmark$ simplification $\checkmark i = 0,1848\dots$ $\checkmark$ answer (4)
7.2.2	$A = P(1+i)^n$ $A = 500\,000(1+0,063)^5$ $A = R678\,635,11$	$\checkmark$ subs into correct formula $\checkmark$ answer (2)
7.2.3	Sinking Fund = $678\,635,11 - 180\,000$ = R 498 635,11 $498\,635,11 = \frac{x \left[\left(1 + \frac{0,1025}{12}\right)^{58} - 1 \right] \left(1 + \frac{0,1025}{12}\right)^3}{\frac{0,1025}{12}}$ $x = R6\,510,36$	$\checkmark$ value of sinking fund $\checkmark \frac{0,1025}{12}$ $\checkmark n = 58 \text{ (A)}$ $\checkmark \left(1 + \frac{0,1025}{12}\right)^3$ $\checkmark$ answer (A) (5)
		[15]

7. 'n Trekker se boekwaarde, dan hoe lank R75 000 neem om te groei

Amptelike DBE-nasienriglyn · November 2021 · V8 · 16 punte

QUESTION/VRAAG 8

8.1	$A = P(1-i)^n$ $A = 980\ 000(1-0,092)^7$ $A = R498\ 685,82$	✓ correct formula ✓ substitution ✓ answer (A) (3)
8.2	$A = P(1+i)^n$ $116\ 253,50 = 75\ 000\left(1 + \frac{0,068}{4}\right)^{4n}$ $1,550\ 046\ 667 = (1,017)^{4n}$ $\log(1,550\ 046\ 667) = 4n \log(1,017)$ $4n = \frac{\log(1,550\ 046\ 667)}{\log(1,017)}$ or $4n = \log_{1,017}(1,550\ 046\ 667)$ $4n = 25,99 \dots$ $n = 6,50$ years	✓ $\frac{0,068}{4}$ ✓ substitution in correct formula ✓ correct use of logs ✓ answer (4)
8.3.1	$F = \frac{x[(1+i)^n - 1]}{i}$ $450\ 000 = \frac{x\left[\left(1 + \frac{0,0835}{12}\right)^{60} - 1\right]}{\frac{0,0835}{12}}$ $x = R6\ 068,69$	✓ $i = \frac{0,0835}{12}$ ✓ substitution into correct formula ✓ answer (3)
8.3.2(a)	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $11\ 058,85 \left[1 - \left(1 + \frac{0,12}{12}\right)^{-4 \times 12}\right]$ $P = \frac{0,12}{12}$ $P = R419\ 948,32$ OR/OF Balance = A – F $= P(1+i)^n - \frac{x[(1+i)^n - 1]}{i}$ $= 1\ 050\ 000\left(1 + \frac{0,12}{12}\right)^{12 \times 21} - \frac{11\ 058,85\left[\left(1 + \frac{0,12}{12}\right)^{12 \times 21} - 1\right]}{\frac{0,12}{12}}$ $= R12\ 887\ 702,20 - R12\ 467\ 749,81$ $= R419\ 952,39$	✓ $n = 48$ in P-formula ✓ substitution into correct formula ✓ answer (A) (3) OR/OF ✓ $n = 252$ in both formulae ✓ subst into correct formulae ✓ answer (A) (3)

8.3.2(b)	Total paid = $11\,058,85 \times 21 \times 12 = 2\,786\,830,20$ Loan Paid = $1\,050\,000 - 419\,948,32 = 630\,051,68$ Interest paid = $2\,786\,830,20 - 630\,051,68$ = R2 156 778,52 OR/OF Total paid = $11\,058,85 \times 21 \times 12 = 2\,786\,830,20$ Loan Paid = $1\,050\,000 - 419\,952,39 = 630\,047,61$ Interest paid = $2\,786\,830,20 - 630\,047,61$ = R2 156 782,59 OR/OF Interest paid = $11\,058,85 \times 21 \times 12 - (1\,050\,000 - 419\,948,32)$ = $2\,786\,830,20 - 630\,051,68$ = R2 156 778,52	✓ $11\,058,85 \times 21 \times 12$ ✓ $1\,050\,000 - \text{Balance Outstanding}$ ✓ answer (3) OR/OF ✓ $11\,058,85 \times 21 \times 12$ ✓ $1\,050\,000 - \text{Balance Outstanding}$ ✓ answer (3) OR/OF ✓ $11\,058,85 \times 21 \times 12$ ✓ $1\,050\,000 - \text{Balance Outstanding}$ ✓ answer (3)
		[16]

8. r en die effektiewe koers uit ses maande, dan om 'n skootrekenaar te vervang

Amptelike DBE-nasienriglyn · November 2023 · V6 · 16 punte

QUESTION 6/VRAAG 6

6.1.1	$A = P(1+i)^n$ $19\,319,48 = 18\,500\left(1 + \frac{r}{1200}\right)^6$ $\left(1 + \frac{r}{1200}\right) = \sqrt[6]{1,04429...}$ $\frac{r}{1200} = 0,00725...$ $r = 8,7\%$	✓ $n = 6$ ✓ substitution into correct formula ✓ answer (3)
6.1.2	$1 + \frac{i}{100} = \left(1 + \frac{8,7}{1200}\right)^{12}$ $r = 9,06\%$	✓ substitution into correct formula ✓ answer (2)
6.2.1	$A = P(1-in)$ $0 = 10\,000(1-0,2n)$ $n = 5$	✓ substitution into correct formula ✓ answer (2)
6.2.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $20\,000 = \frac{x\left[\left(1 + \frac{8,7}{1200}\right)^{60} - 1\right]}{\frac{8,7}{1200}}$ $x = R267,26$	✓ i ✓ n ✓ substitution into correct formula ✓ answer (4)
6.3	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $1\,600\,000 = \frac{20\,000\left[1 - \left(1 + \frac{0,112}{12}\right)^{-n}\right]}{\frac{0,112}{12}}$ $\frac{56}{75} = 1 - \left(1 + \frac{0,112}{12}\right)^{-n}$ $\left(1 + \frac{0,112}{12}\right)^{-n} = \frac{19}{75}$ $-n = \log_{\left(1 + \frac{0,112}{12}\right)}\left(\frac{19}{75}\right)$ $-n = -147,80$ Tino will make 147 withdrawals of R20 000	✓ i ✓ substitution into correct formula ✓ correct use of logs ✓ $-n = -147,80$ ✓ $n = 147$ (5)
		[16]