GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION

COMMERCIAL MATHEMATICS SG

TIME: 3 hours

MARKS: 300

REQUIREMENTS:

- Commercial Tables $s_{n}+$ $a_{n}+$
- Graph Paper

INSTRUCTIONS:

- Answer ALL the questions.
- You must show ALL calculations (how you worked out answers).
- Write the number of the question above each answer.
- Do not write in the margins.
- You may use a calculator for all calculations but NOT for Question 1.3.
- Neatness and the systematic arrangement of your work will count in your favour.
- Use the graph sheet given when you answer Question 10.
- There are information pages at the end of this examination paper. You may use this information to answer the questions.
- $p = 22/7$
- Answers must be given correct to the nearest (closer to) cent or two decimal places.

QUESTION 1
RATIO AND PROPORTION, MIXTURES AND STATISTICS

1.1 The estimated number of young people (between the ages of 20 and 30 years) newly infected with HIV during 2005 is as shown:

North America	25 000
Caribbean and Latin America	65 000
Eastern Europe and Central Asia	25 000
North Africa and Middle East	5 000
Asia and Pacific	700 000
Sub-Saharan Africa	1 700 000

Calculate (work out)

1.1.1 the mean; (2)
1.1.2 the mode; and (2)
1.1.3 the median of young people newly infected with HIV during 2005. (3)

1.2 A, B and C are partners in a company. They divide their weekly profit of R7 800 in the ratio:
A : B : C = ½ : ⅓ : ¼
Calculate their weekly profit. (5)

1.3 Simplify (work out) without the use of a calculator: $\frac{5}{6} \div \frac{1}{3} \times (0,2)^2$ (4)

1.4 If 5 kg tea at R14 per kg is mixed with 8 kg of tea at R27 per kg, Calculate (work out) the average price per 1 000g tea. (4)
[20]

QUESTION 2
INSOLVENCY

2.1 An insolvent estate paid a dividend of 60 cents in the rand. A creditor received R1 615,20. What was the total value of the claim? (4)

2.2 A bankrupt estate had the following assets: a) a cash sum of R4 620 and b) fixed property on which there was a bond of R80 000 and which was sold for R75 000. Outstanding debts owing to the estate amounted to R3 600. Only 80% of this amount could be collected. The trustees' expenses for the administration of the estate were R2 100 and concurrent claims were R4 000. Calculate

2.2.1 the final dividend paid out. (12)
2.2.2 the sum paid to the mortgagee. (4)
[20]

QUESTION 3
PARTNERSHIP

3.1 Reena started a business on 1 March 2005. Reena started with a capital of R40 000 Three months later Doris joined to start a partnership. Doris gave a capital of R30 000.

The partnership agreement stated (said) the following:

(i) Each partner is to receive (get) a monthly salary of R6 000.
(ii) Interest on capital is to be 10% p.a.
(iii) Remaining profits to be shared in the ratio Reena : Doris = 4 : 3

If the profit for the year ended 28 February 2006 was R188 250, what would Doris's share of the profit be? Calculate. (17)

3.2 Nompho and Cindy started a partnership on 1 April 2005, Nompho put in her capital of R25 000 and Cindy put in her capital of R30 000. On 30 June 2005 Nompho withdrew (took out) R10 000. Cindy contributed (put in) another R5 000 on 1 October 2005. Profits should be divided in ratio of capital contributions (payments), and the period of investment must also be used.

Calculate:

The ratio in its simplest (easiest) form on 31 March 2006. (8)

[25]

QUESTION 4
PROFIT AND LOSS

4.1 Garth is a dealer. He sells an article for R560. Garth gains 25% on cost price. Garth bought the article from DB Wholesaler, which marks all the goods at 12% above selling price.

4.1.1 Calculate the dealer's cost price for this article. (7)
4.1.2 Calculate the wholesaler's cost price for this article. (7)

4.2 If the selling price is R544 and the seller Fatima makes a profit of 25% on the selling price, what will the percentage profit or loss on the cost price be? (8)

4.3 A dealer, Simon, marked a certain article at 60% above cost price. Later his marked price was reduced (lent down) by 12,5% and a further (more) discount of 5% was allowed for cash. This article was sold for cash to a customer, Jeanette, at R5 985,00.

Calculate:

4.3.1 The cost price of the article (10)
4.3.2 The original marked price of the article (4)
4.3.3 The percentage profit on cost price (4)

[40]

QUESTION 5
STOCKS AND SHARES

5.1 J Modise sells 8 000 7% ABC stock at 110 and invests the amount received in R3,50 ordinary shares at R2,75. Calculate the number of shares bought. (8)

5.2 Calculate which of the following investments is most profitable:

5.2.1 R30 share at R36 per share and received a dividend of R6 per share (5)
5.2.2 75c share at 90c per share on which a dividend of 15% is declared (6)
5.2.3 15% Gold R3 preference shares at R2.25 (8)
(Ignore brokerage and expenses.)

5.3 Laluma holds R3 600 ABC 9% stock that she sells at 80. With the proceeds she buys 15% XYZ stock at 125. Calculate:

5.3.1 The proceeds from the sale of ABC stock (4)
5.3.2 The nominal value of XYZ stock (4)
[35]

QUESTION 6
MENSURATION

6.1 A measuring wheel makes 20 revolutions going around a circle with an area 154 m^2. Find the circumference of the measuring wheel. (10)

6.2 A cylindrical pipe 140 cm long with an external diameter of 8 cm was made from 3 080 cm^3 of metal. Find the internal radius of the cylindrical pipe. (10)

6.3 Find the area of a triangular piece of ground 8,7 m by 6,3 m by 6,0 m. (9)

6.4 The area of the floor of a dam with circular base is 154 m^2. If the height is 4 m, calculate (work out) the volume of the dam in litres (1 litre = 1000 cm^3). (10)

6.5 The area of a sphere is 616 cm^2. Calculate the radius of the sphere. (6)
[45]

QUESTION 7
INTEREST, DEPRECIATION, INSURANCE

7.1 You have invested amount from 1 March 2005 to 12 May 2005 at 15% per annum simple interest. The amount reached R2 000. Calculate the first amount that you have invested. show your calculations. (10)

7.2 By using a diminishing balancing method, an asset of R60 000 was depreciated at 25% per annum. Calculate the residual value of the asset after 5 years. (8)

7.3 Simon Lewis is a financial consultant. He, has R20 000 to invest for three years and is faced with two options:

Option A is to invest R20 000 at 6% p.a. compounded half-yearly interest.
Option B is to invest the R20 000 at 8% p.a. compounded annually.
Which is the most profitable option for investing?
Show your calculations clearly. (14)

7.4 Equipment is valued at R300 000. The insurance premium is 55 cents per cent. Calculate the premium payable if the policy covers the premium. (8)

[40]

QUESTION 8
ANNUITIES

Use the commercial tables to calculate the following:

8.1 The annual instalment to redeem a loan of R518 985 at 5% per annum compound interest in 15 equal instalments (4)

8.2 The principal to be invested at the end of each year to yield R168 800 after 19 years if the investment earns 6% p.a. compound interest (4)

8.3 The amount due to a person at the end of 8 years if the person invests R4 000 at the beginning of each year at 4 % per annum compound interest (6)

8.4 The annual annuity that can be bought for the sum of R16 170 for a period of 6 years if the interest rate is 4 ½ % per annum compounded annually and the first payment is made immediately (6)

[20]

QUESTION 9
RATES OF EXCHANGE, TAXES

9.1 How many US Dollars can be bought for R19 501,50 if $1 = R6,5005? (4)

9.2 You are a buyer for a South African company. Assume the following exchange rate is applicable:

$1 (US) = R6,5005 (South African Rand) = ¥109,27 (Japan)
The following prices are quoted to you in SA:

- One computer costs $250 in the USA
- One computer costs ¥28 000 in Japan

From which country would you import computers? Substantiate your answer. (Show all calculations.) (10)

9.3 The Joburg Metropolitan Municipality bills its customers as follows:

Electricity at 43,67 cents per kilowatt (kw)
Water rates are as follows:

First 6kl	Free
6 – 10kl	R3,60 per kl
10 – 15kl	R4,80 per kl
15 – 20kl	R6,00 per kl
20 – 40kl	R7,19 per kl
>40 kl	R8,50 per kl

How much does a consumer pay if the consumer used 938 kw of electricity and 45 kl of water? (11)

[25]

QUESTION 10
GRAPHS

The following table compares the end amounts of R1 000 invested at 3 ½ % per annum compound interest, and at 6% per annum simple interest, respectively.

Years	5	10	15	20	25	30	35
R1 000 at 3 ½ % compound interest in R	1 190	1 410	1 680	1 990	2 360	2 800	3 330
R1 000 at 6% simple interest in R	1 300	1 600	1 900	2 200	2 500	2 800	3 100

10.1 Show these data graphically on the same axes, using the following information:

Origin: R1 000 and 0 years
Scale: Horizontal axis 2 cm = 5 years
Vertical axis 2 cm = R 200
Use the graph paper that has been provided. (18)

10.2 Use the graph to determine the following (show your readings with dotted lines):

10.2.1 After how many years will the final amounts of the two investments be equal? (3)
10.2.2 The total of the final amounts of the two investments at that stage (3)
10.2.3 How long will it take for R1 000 invested at 3 ½ % per annum compound interest to double? (3)
10.2.4 The interest earned on an investment of R 1000 at 6% per annum simple interest for 17 years (3)

[30]

TOTAL: 300

COMMERCIAL MATHEMATICS / *HANDELSWISKUNDE*
INFORMATION SHEET / *INLIGTINGSBLAD*

1. MENSURATION / *METING*

1.1 Right-angled triangle: / *Reghoekige driehoek*:

Area = ½ base X height / *Area = ½ basis X hoogte*

Theorem of Pythagoras: / *Stelling van Pythagoras*
$(\text{hypotenuse})^2 = (\text{base})^2 + (\text{height})^2$ / $(skuinssy)^2 = (basis)^2 + (hoogte)^2$

1.2 Non right-angled triangle: / *Nie-reghoekige driehoek:*
Area of triangle when side lengths a, b and c are given /
Area van driehoek as die lengtes van sye a, b en c gegee word
$A = \sqrt{s(s-a)(s-b)(s-c)}$ where s = ½ (a+b+c) /
$A = \sqrt{s(s-a)(s-b)(s-c)}$ *waar* $s = ½ (a+b+c)$

1.3 Circle: / *Sirkel*
Circumference (c) = $2\pi r$ / *Omtrek (c) =* $2\pi r$
Area of Circle: $A = \pi r^2$ / *Area van Sirkel:* $A = \pi r^2$

1.4 Triangular prism (base is a triangle): /
Driehoekige prisma (basis is 'n driehoek):
Volume of prism = Area of base X height /
Volume van prisma = Area van basis X hoogte

1.5 Solid cylinder (circular prism): / *Soliede silinder (sirkelvormige prisma)*
Volume of cylinder: / *Volume van silinder*
V = Area of base X height = $\pi r^2 h$ / V = *Area van basis X hoogte* = $\pi r^2 h$
Cylindrical pipe / *Silindriese pyp*
Volume of pipe (material): / *Volume van pyp (materiaal):*
$V = \pi R^2 h - \pi r^2 h$ where R is Die external radius and r is the internal radius /
$V = \pi R^2 h - \pi r^2 h$ *waar R die eksterne radius en r die interne radius is*
$= \pi h (R-r) (R+r)$ / $= \pi h (R-r) (R+r)$

1.6 Sphere: / *Sfeer*
Area of sphere: / *Area van sfeer:*
$A = 4\pi r^2$ / $A = 4\pi r^2$
Volume of sphere: / *Volume van sfeer*:
$V = \frac{4}{3}\pi r^3$ / $V = \frac{4}{3}\pi r^3$

2. SIMPLE INTEREST / *ENKELVOUDIGE RENTE*

$I = \frac{PxRxT}{100}$ where I = Simple Interest / $I = \frac{PxRxT}{100}$ *waar I = Enkelvoudige Rente*

P = Principal / *Kapitaal*
R = Rate per cent per annum / *Koers per sent per annum*
T = Time / *Tyd*

$P = \frac{A}{1+B}$ $P = \frac{A}{1+\frac{RT}{100}}$

3. COMPOUND INTEREST / *SAAMGESTELDE RENTE*

$A = P\left(1+\frac{r}{100}\right)^n$ where / *waar* A = Amount (at the end of the investment period) /
A = Bedrag (aan die einde van die beleggingsperiode)
P = principal (the money invested) /
P = kapitaal (geld wat belê is)
r = rate / *r = koers*
n = number of years / *n = aantal jare*

4. INSURANCE / *VERSEKERING*

Insurance which also covers the premium: / *Versekering wat ook die premie dek:*

$P = \frac{Vp}{V-p}$ where / *waar* V = value insured / *V = versekerde waarde*
p = premium due on value insured /
p = premie betaalbaar op versekerde waarde
P = total cost to insure the value as well as the premium /
P = totale koste om sowel die waarde as die premie te verseker

5. DEPRECIATION / *WAARDEVERMINDERING*

Formula for residual value: / *Formule vir reswaarde*

$RV = CP\left(1-\frac{r}{100}\right)^n$ where / waar RV = residual value / *RV = reswaarde*
CP = cost price / *CP = kosprys*
r = rate of depreciation / *waardevermindering*
n = number of years / *aantal jare*

AMOUNT OF R1 PER ANNUM AT THE END OF THE PERIOD

S_n+

n	3½%	4%	4½%	5%	6%	7%	8%	*n*
1	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1
2	2,0350	2,0400	2,0450	2,0500	2,0600	2,0700	2,0800	2
3	3,1062	3,1216	3,1370	3,1525	3,1826	3,2149	3,2464	3
4	4,2149	4,2465	4,2782	4,3101	4,3746	4,4399	4,5061	4
5	5,3625	5,4163	5,4707	5,5256	5,6371	5,7507	5,8666	5
6	6,5502	6,6330	6,7169	6,8019	6,9753	7,1533	7,3359	6
7	7,7794	7,8983	8,0192	8,1420	8,3938	8,6540	8,9228	7
8	9,0517	9,2142	9,3800	9,5491	9,8975	10,2598	10,6366	8
9	10,3685	10,5828	10,8021	11,0266	11,4913	11,9780	12,4876	9
10	11,7314	12,0061	12,2882	12,5779	13,1808	13,8164	14,4866	10
11	13,1420	13,4864	13,8412	14,2068	14,9716	15,7836	16,6455	11
12	14,6020	15,0258	15,4640	15,9171	16,8699	17,8885	18,9771	12
13	16,1130	16,6268	17,1599	17,7130	18,8821	20,1406	21,4953	13
14	17,6770	18,2919	18,9321	19,5986	21,0151	22,5505	24,2149	14
15	19,2957	20,0236	20,7841	21,5786	23,2760	25,1290	27,1521	15
16	20,9710	21,8245	22,7193	23,6575	25,6725	27,8881	30,3243	16
17	22,7050	23,6975	24,7417	25,8404	28,2129	30,8402	33,7502	17
18	24,4997	25,6454	26,8551	28,1324	30,9057	33,9990	37,4502	18
19	26,3572	27,6712	29,0636	30,5390	33,7600	37,3790	41,4463	19
20	28,2797	29,7781	31,3714	33,0660	36,7856	40,9955	45,7620	20
21	30,2695	31,9692	33,7831	35,7193	39,9927	44,8652	50,4229	21
22	32,3289	34,2480	36,3034	38,5052	43,3923	49,0057	55,4568	22
23	35,4604	36,6179	38,9370	41,5305	46,9958	53,4361	60,8933	23
24	36,6665	39,0826	41,6892	44,5020	50,8156	58,1767	66,7648	24
25	38,9499	41,6459	44,5652	47,7271	54,8645	63,2490	73,1059	25

PRESENT VALUE OF R1 PER ANNUM FOR A PERIOD

a_n+

n	3½%	4%	4½%	5%	6%	7%	8%	*n*
1	0,9662	0,9615	0,9569	0,9524	0,9434	0,9346	0,9259	1
2	1,8997	1,8861	1,8727	1,8594	1,8334	1,8080	1,7833	2
3	2,8016	2,7751	2,7490	2,7232	2,6730	2,6243	2,5771	3
4	3,6731	3,6299	3,5875	3,5460	3,4651	3,3872	3,3121	4
5	4,5151	4,4518	4,3900	4,3295	4,2124	4,1002	3,9927	5
6	5,3286	5,2421	5,1579	5,0757	4,9173	4,7665	4,6229	6
7	6,1145	6,0021	5,8927	5,7864	5,5824	5,3893	5,2064	7
8	6,8740	6,7327	6,5959	6,4632	6,2098	5,9713	5,7466	8
9	7,6077	7,4353	7,2688	7,1078	6,8017	6,5152	6,2469	9
10	8,3166	8,1109	7,9127	7,7217	7,3601	7,0236	6,7101	10
11	9,0016	8,7605	8,5289	8,3064	7,8869	7,4987	7,1390	11
12	9,6633	9,3851	9,1186	8,8633	8,3838	7,9427	7,5361	12
13	10,3027	9,9856	9,6829	9,3936	8,8527	8,3577	7,9038	13
14	10,9205	10,5631	10,2228	9,8986	9,2950	8,7455	8,2444	14
15	11,5174	11,1184	10,7395	10,3797	9,7122	9,1079	8,5595	15
16	12,0941	11,6523	11,2340	10,8378	10,1059	9,4466	8,8514	16
17	12,6513	12,1657	11,7072	11,2741	10,4773	9,7632	9,1216	17
18	13,1897	12,6593	12,1600	11,6896	10,8276	10,0591	9,3719	18
19	13,7098	13,1339	12,5933	12,0853	11,1581	10,3356	9,6036	19
20	14,2124	13,5903	13,0079	12,4622	11,4699	10,5940	9,8181	20
21	14,6980	14,0292	13,4047	12,8212	11,7641	10,8355	10,0168	21
22	15,1671	14,4511	13,7844	13,1630	12,0416	11,0612	10,2007	22
23	15,6204	14,8568	14,1478	13,4886	12,3034	11,2722	10,3711	23
24	16,0584	15,2470	14,4955	13,7986	12,5504	11,4693	10,5288	24
25	16,4815	15,6221	14,8282	14,0939	12,7834	11,6536	10,6748	25

GRAPH PAPER FOR QUESTION 10/
GRAFIEKPAPIER VIR VRAAG 10

CANDIDATE'S NUMBER / *KANDIDAAT SE NOMMER*:

INSTRUCTIONS / *INSTRUKSIES*:

§ Complete this graph paper for Question 10, then place it at the back of your Answer Book.
§ *Voltooi hierdie grafiekpapier vir Vraag 10, en plaas dit agter in jou antwoordboek.*

END / *EINDE*