FURTHER CONSUMER ARITHMETIC

Note: Only turn back to page number if you have difficulty	Page
Q1. Find the simple interest on a principal of: (a) \$5893 at 23% p.a. for 3 months. (b) \$16 330 at $9\frac{1}{2}$% p.a. for 32 months. (c) \$27 500 at 4.25% p.a. for 44 days.	165
Q2. What simple interest rate would allow \$10 110 to grow to \$14 027 in 5 years? [Answer to 4 d.p.]	165
Q3. Find the compound interest on a principal of: (a) \$6540 at 6% p.a. for 4.5 years. (b) \$15 430 at $5\frac{1}{4}$% p.a. for 42 months. (c) \$182 500 at 12.2% p.a. for 75 months.	166, 167
Q4. Find the compound interest on a principal of: (a) \$1040 invested for 20 years at 15% p.a. compounded half yearly. (b) \$30 600 invested for 2 years at 6% p.a. compounded quarterly. (c) \$11 920 borrowed at 8% p.a. for $5\frac{1}{2}$ years compounded monthly.	166, 167
Q5. I want to invest \$3550 for 10 years. I have a choice of investing at a simple interest rate of 15.5% p.a. or a compound rate of 10.25% p.a. Which is the better option and by how much?	165 – 167
Q6. \$7500 is invested for 3 years with interest compounded biannually. If at the end of the 3 years the investment is worth \$9767, what is the applied interest rate?	167
Q7. Find the value after 8 years of: (a) a car costing \$29 000 depreciated at 15% p.a. (b) a fax machine costing \$569 depreciated at 6.5% p.a. (c) a mobile phone costing \$799 depreciated at $33\frac{1}{3}$% p.a.	168
Q8. After being depreciated at 7% p.a. for 12 years, a laser printer is valued at \$413. What was its value 12 years ago?	168
Q9. Joe and Wendy bought a house costing \$210 000. They paid a 35% deposit and borrowed the remainder at a flat interest rate of 7.75% p.a. payable over 25 years. What is the amount of their total monthly instalment?	170, 171
Q10. A \$25 000 loan is repaid over 8 years with monthly instalments of \$391. What was the interest rate (p.a.) charged on the loan?	170, 171

(g) $\angle DFC = \angle GBF$ (corr. $\angle$'s EB || DF)
$\angle EGD = \angle GBF$ (corr. $\angle$'s AD || BC)
In ΔEGD and ΔDFC:
$\angle EGD = \angle DFC$ (proven above)
$\angle GED = \angle FDC$ (corr. $\angle$'s EB || DF)
GD = FC (data)
$\therefore$ $\Delta EGD \equiv \Delta DFC$ (AAS)
$\therefore$ ED = DC (corr. sides of cong. Δ's)

(h) In ΔADE and ΔFBC:
AD = BC (opp. sides of rectangle)
$\angle ADE = \angle FBC$ (alt. $\angle$'s AD || BC)
DE = FB (data)
$\therefore$ $\Delta ADE \equiv \Delta FBC$ (SAS)
$\angle AED = \angle BFC$ (corr. $\angle$'s or cong. Δ's)
$\angle AEF = \angle EFC$ (supp. to $\angle AED$ and $\angle BFC$ respectively)
$\therefore$ AE || FC ($\angle AEF$ and $\angle EFC$ alt. $\angle$'s)

(i) In ΔADE and ΔABF:
AD = AB (sides of rhombus)
$\angle ADE = \angle ABF$ (opp. $\angle$'s of rhombus)
DE = DC – EC
BF = BC – CF
DE = BF (DC = BC sides of rhombus and EC = CF data)
$\therefore$ $\Delta ADE \equiv \Delta ABF$ (SAS)
$\therefore$ AE = AF (corr. sides of cong. Δ's)

Level 1 — Trigonometry

Q1. (a) h : AB; op : CB; adj : AC (b) h : AC; op : AB; adj : CB (c) h : CB; op : AC; adj : AB
Q2. (a) 0.766 (b) 0.259 (c) 0.625 (d) 0.668 (e) 0.225 (f) 0.922
Q3. (a) 71° 6' (b) 64° 17' (c) 38° 04' (d) 7° 04' (e) 55° 19' (f) 55° 07'
Q4. (a) $x = 9.2$ cm (b) $x = 4.6$ cm (c) $\theta = 22° 37'$
Q5. (a) $x = 6.14$ cm (b) $x = 15.01$ cm (c) $\theta = 55° 46'$
Q6. (a) $x = 19.63$ cm (b) $x = 13.33$ cm (c) $\theta = 59° 45'$
Q7. 1.97 m
Q8. (a) 9.46 cm (b) 13.35 cm (c) 9.60 cm (d) 52.32 cm (e) 9.71 cm (f) 21.43 cm
Q9. (a) 35.79 m (b) 744 m
Q10. (a) 21.79 km (b) 7.25 km (c) (i) 225° (ii) 315° (iii) 9.48 km

Level 2 — Trigonometry

Q1. (a) 28.80 m (b) 17 m
Q2. d = 7.1 cm, $\ell = 6.0$ cm
Q3. 156 m
Q4. 148 m; 2 nautical miles per hour
Q5. (a) 8.49 cm (b) 9.95 cm
(c) 64° 46' (d) 72° 27'
Q6. 185° 43'
Q7. (a) 21.9 km (b) 33° 38'

Further consumer arithmetic

Q1. (a) \$338.85 (b) \$4136.93 (c) \$140.89
Q2. 7.75% p.a.
Q3. (a) \$1960.69 (b) ~~\$3026.24~~ \$3105.04 (c) ~~\$192 229.79~~ \$207 208.96
Q4. (a) ~~\$1776.01~~ \$17726.01 (b) \$3870.67 (c) \$6561.26
Q5. compound interest pays an extra \$366.71
Q6. 4.5% per 6 months or 9% p.a.
Q7. (a) \$7902.23 (b) \$332.36 (c) \$31.18
Q8. \$986.63
Q9. ~~\$1336.56~~/month \$881.56
Q10. ~~6.3% p.a.~~ 5.21% p.a.

Q1)

a) $5893 × 23% × 3/12

= ~~$1888~~ = $338.85 ✓

b) $16330 × 9½% × 32/12

= $4136.93 ✓

c) $27500 × 4.25% × 44/365

= $140.99 ✓

Q2)

$3917 = $10110 (r) × 5

$3917/$10110 = (r) × 5

0.38743818 = (r) × 5

r = 0.07748 7636 ✓

Q3)

~~r~~ = 7.75%

a) $6540 × (1 + 0.06)^(4·5)

= 8500.68928 ✓

I = $1960.69

b) A = $15430 (1 + 0.0525/12)^42

= $18535.03

I = A − P

I = 3105.04 ✓

c) 182500 (1 + 0.122/12)

= 389708.9598 ✓

= $207208.96

4)

a) $1040 (1 + 0.15/2)^(20×2) ✓

= 18766.01 ✓

I = 17726.01 ✓

b) $30600 (1 + 0.06/4)^(2·4) ✓

= $34470.67

I = $3870.67 ✓

c) $11920 (1 + 0.08/12)^(5½×12)

$11920 (1.55044164)

= $18481.26435

I = $6561.26 ✓

5) SI ~~$~~ $3550 × (15.5%) × 10

= 5502.5 ✓

CI $3550 × (1 + 0.1025)^10

is better = 9419.206853

by $3916.71 ✓ I = 5869.21 ✓

3916.71

$366.71

Q6) $7500 × (1 + r/2)

$9767 = $7500 (1 + 2r)^{3/2}

$9767 / $7500 = (1 + 2r)^{3/2} ✓

1.30226666 = (1 + 2r)^{3/2}

(∛1.30226)^2 = 1 + 2r

r = 0.09 ✓

r = 9%

Q7)

a) $29000 (1 − 0.15)^8

= $7902.23 ✓

b) $569 (1 − 0.065)^8

$569 (0.935)^8

= $332.36 ✓

c) $799 (1 − 33⅓%)^8

$799 (2/3)^8

$31.18 ✓

Q8) $413 = P(1 − 0.07)^12

= $986.63 ✓

Q9) $210000 × 35% = $73500

210000 − 73500 = $136500

$136500 × 7.75% / 12 = monthly payment

≈ $881.56 ✓

Q10) $391 × 12 × 8 = 37536 ✓

$A_n = P(1 + r/100)^{n·d}$

25000

37536 = 25000 (1 + r/100)^8

37536 / 25000 = (1 + r/100)^8 ✓

∛1.50144 = 1 + r/100

1.05211569 = 1 + r/100

0.05211569 = r/100 ✓

5.2115691 = r ✓