Gr 10 June Exam /100 29.05.23

1.1.1. $x = -8; 0$ or 7 ✓ all — 1

1.1.2. $x = 9$ ✓ — 1

1.1.3. $x = -34$ ✓ — 1

1.1.4. $x = -8$ or 0 ✓ both — 1

1.2.1. $[5a^2 - (3a+b)][5a^2 + (3a+b)]$

$p = 5a^2 \quad q = 3a+b$

$\therefore [p-q][p+q]$

$= p^2 - q^2$

$= (5a^2)^2 - (3a+b)^2$

$= 25a^4 - (9a^2 + 6ab + b^2)$ ✓

$= 25a^4 - 9a^2 - 6ab - b^2$ ✓ — 2

1.2.2. $(x^3 - y^3)(x^4 + x^2y^2 + y^3)$

$= x^7 + x^5y^2 + x^3y^3 - x^4y^3 - x^2y^5 - y^6$ ✓ ✓ — 2

1.2.3. $x^{3/5}(3x^{2/5} - 4x^{-3/5})$

$= 3x^1 - 4x^0$

$= 3x - 4$ ✓ ✓ — 2

1.2.4. $\dfrac{5 \cdot 2^{n+2}}{2^{n+4} - 6 \cdot 2^{n+1}}$

$= \dfrac{5 \cdot 2^n \cdot 2^2}{2^n \cdot 2^4 - 6 \cdot 2^n \cdot 2^1}$ ✓

$= \dfrac{5 \cdot 2^n \cdot 4}{2^n(2^4 - 6 \cdot 2)}$ ✓

$= \dfrac{20 \cdot 2^n}{2^n(4)}$ 16−12

$= \dfrac{20}{4}$

$= 5$ ✓ — 3

1.2.5. $\dfrac{2x-1}{x^2-3x+2} - \dfrac{x-4}{x^2-4} - \dfrac{1}{1-x}$

$= \dfrac{2x-1}{(x-2)(x-1)} - \dfrac{x-4}{(x+2)(x-2)} + \dfrac{1}{x-1}$ ✓ ✓ ✓

$= \dfrac{(2x-1)(x+2) - (x-4)(x-1) + 1(x-2)(x+2)}{(x-2)(x-1)(x+2)}$

$= \dfrac{2x^2 + 3x - 2 - (x^2 - 5x + 4) + (x^2 - 4)}{(x-2)(x-1)(x+2)}$

$= \dfrac{2x^2 + 3x - 2 - x^2 + 5x - 4 + x^2 - 4}{(x-2)(x-1)(x+2)}$

$= \dfrac{2x^2 + 8x - 10}{(x-2)(x-1)(x+2)}$ ✓num ✓den

$= \dfrac{2(x^2 + 4x - 5)}{(x-2)(x-1)(x+2)}$

$= \dfrac{2(x-1)(x+5)}{(x-2)(x-1)(x+2)}$

$= \dfrac{2(x+5)}{(x-2)(x+2)}$ — 5

2.1.1. $6(1-x^2) = 5x$

$6 - 6x^2 = 5x$ ✓

$0 = 6x^2 + 5x - 6$ ✓

$= (3x-2)(2x+3)$ ✓

$\therefore x = 2/3$ or $-3/2$ ✓ 3

2.1.2. $2a(x-b) = 3(a-x)$

$2ax - 2ab = 3a - 3x$ ✓

$2ax + 3x = 3a + 2ab$

✓ $x(2a+3) = 3a + 2ab$

$x = \frac{3a+2ab}{2a+3}$ ✓

$= \frac{a(3+2b)}{2a+3}$ 3

2.1.3. $2^{x(x-3)} = 0,25$

$= \frac{1}{4}$

$= \frac{1}{2^2}$

$= 2^{-2}$ ✓

$\therefore x(x-3) = -2$

$x^2 - 3x + 2 = 0$ ✓

$(x-2)(x-1) = 0$ ✓

$x = 2$ or 1 ✓ 4

(OR)

$x(x-3) = \frac{\log 0,25}{\log 2}$ ✓

$= -2$

etc.

2.1.4. $3x - \frac{4x+4}{16} = 3 + \frac{3(x-1)}{4}$

$3x - \frac{4(x+1)}{16} = 3 + \frac{3(x-1)}{4}$

$3x - \frac{x+1}{4} = 3 + \frac{3(x-1)}{4}$

LCD = 4

x thru

$3x \cdot 4 - (x+1)$ ✓ $= 12 + 3(x-1)$

$12x - x - 1$ ✓ $= 12 + 3x - 3$

$8x = 10$

x ✓ $= \frac{5}{4}$ 3

2.1.5. $4.5^x = 120$

$5^x = 30$ ✓

$x = \frac{\log 30}{\log 5}$ ✓

$= 2,11$ ✓ 3

2.1.6. $5x^{-2/3} - 7 = 0$

$x^{-2/3} = \frac{7}{5}$ ✓

$(x^{-2/3})^{-3/2}$ ✓ $= \pm\left(\frac{7}{5}\right)^{-3/2}$ ✓

$x = \pm 0,60$ 4

✓

2.1.7. $2(x+3) - 5 = 2x + 1$

$2x + 6 - 5 = 2x + 1$

$0x = 0$

$\therefore x \in R$ ✓ 1

2.2 $3a - 2b = -29$ ... 1

$2a - b = -18$ ... 2

Subⁿ:

$2a + 18 = b$ ✓

$3a - 2(2a+18) = -29$ ✓

$3a - 4a - 36 = -29$

$-a = 7$

$a = -7$ ✓

$\therefore b = 2(-7) + 18$

$= 4$ ✓ 4

OR

Elimⁿ:

$3a - 2b = -29$

(2) × -2: ✓ $-4a + 2b = 36$

$-a = 7$

✓ $a = -7$

$2(-7) - b = -18$ ✓

$4 = b$ ✓

2.3. $-1 \leq 3 - 2x \leq 5$

2.3.1. $-4 \leq -2x \leq 2$ ✓

$2 \geq x \geq -1$ ✓ 2

2.3.2. (a) 

✓ 1

(b) $x \in [-1; 2]$ ✓ 1

NB

3.1 $20; 17; 14; \dots; -103$

3.1.1 There is a constant difference of -3 between consecutive terms ∴ Sequence is arithmetic. ✓ 1

3.1.2. $T_n = a + (n-1)d$
$= 20 + (n-1)(-3)$ ✓
$= 20 + (-3n + 3)$
$= 20 - 3n + 3$
$= 23 - 3n$ ✓ 2

3.1.3 $T_n = 23 - 3n$
$-103 = 23 - 3n$ ✓
$3n = 126$
$n = 42$ ✓ 2

3.1.4 $T_n < 0$
$23 - 3n < 0$ ✓
$-3n < -23$
$n > 23/3$
$= 7,6\dots$
∴ T_8 ✓ 2

ans only 2/2

3.2 $x+2; 4x; 6x+4$

3.2.1. $4x - (x+2) = 6x + 4 - 4x$ ✓
$4x - x - 2 = 2x + 4$
$x = 6$ ✓ 2

3.2.2. $T_1 = 6 + 2 = 8$
$T_2 = 4(6) = 24$
$T_3 = 6(6) + 4 = 40$
∴ $8; 24; 40$ all ✓ 1

3.3.1.
$1 = 1$
$1 + 3 = 4$
$1 + 3 + 5 = 9$
$1 + 3 + 5 + 7 = 16$
$1 + 3 + 5 + 7 + 9 = 25$ ✓
$1 + 3 + 5 + 7 + 9 + 11 = 36$ ✓
2

3.3.2. (a) $T_n = a + (n-1)d$
$= 1 + (n-1)(2)$ ✓ a ✓ d ✓ sub
$= 2n - 1$ 3

(b) $T_{235} = 235^2$
$= 55\,225$ ✓ 1

4.1. $A = 15°$ $B = 48°$

4.1.1 $\cos^2(A+B)$

$= [\cos(A+B)]^2$

$= [\cos(15° + 48°)]^2$

$= 0,21$ ✓✓ 2

4.1.2. $\frac{1}{2}\tan 2A \cos B$

$= \frac{1}{2}\tan(2.15°)\cos 48°$

$= 0,19$ ✓ 1

4.2.1. $8\sin\theta = 4$

$\sin\theta = \frac{1}{2}$ ✓

$\theta = \sin^{-1}(\frac{1}{2})$

$= 30°$ ✓ 2

4.2.2. $4 + \cos(\theta + 20°) = 5,123$

$A = \theta + 20°$

$4 + \cos A = 5,123$

$\cos A = 1,123$ ✓

no soln ✓✓ 3

0,6018...

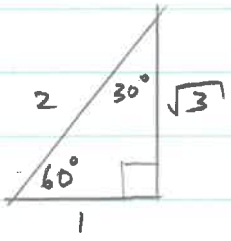
4.2.3. $\frac{4}{3}\cos\theta = \sin 37°$

$\cos\theta = $ ✓✓ $0,45...$

$\theta = \cos^{-1}(0,45...)$

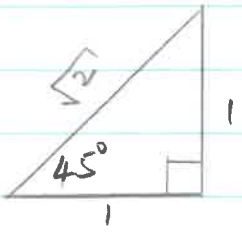
$= 63,17°$ ✓ 3

4.3.1 (a)



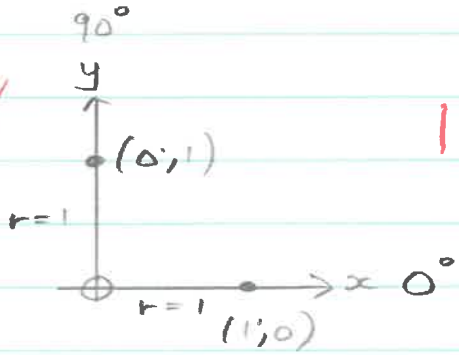
✓ 1

(b)



✓ 1

(c)



✓ 1

4.3.2. (a) $\text{Cosec } 60° = \frac{h}{o}$

$= \frac{2}{\sqrt{3}}$ ✓ 1

(b) $\tan 45° = \frac{o}{a}$

$= \frac{1}{1}$

$= 1$ ✓ 1

NB

NO CA if diagrams are not correct!

(c) $\cot 90^\circ = \frac{x}{y}$

$= \frac{0}{1}$

$= 0$ ✓ 1

(d) $-3\sec^2 30^\circ$

$= -3[\sec 30^\circ]^2$

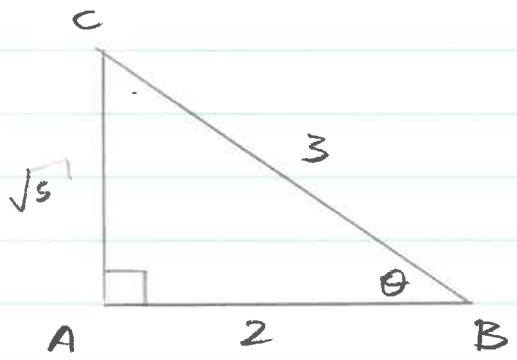
$= -3\left[\frac{h}{a}\right]^2$

$= -3\left[\frac{2}{\sqrt{3}}\right]^2$ ✓

$= -3 \cdot \frac{4}{3}$

$= -4$ ✓ 2

4.4.



4.4.1 $AC^2 + 2^2 = 3^2$ ✓ s pythag

$AC^2 = 5$

$AC = \pm\sqrt{5}$ reject −

$\therefore AC = \sqrt{5}$ ✓ 2

4.4.2 (a) $\sin\theta = \frac{o}{h}$

$= \frac{\sqrt{5}}{3}$ ✓ 1

4.4.2 (b) $2\cos^2\theta$

$= 2[\cos\theta]^2$

$= 2\left[\frac{a}{h}\right]^2$

$= 2\left[\frac{2}{3}\right]^2$ ✓

$= 2 \cdot \frac{4}{9}$

$= \frac{8}{9}$ ✓ 2

(c) $\tan(90^\circ - \theta)$

$\hat{C} + 90^\circ + \theta = 180^\circ$

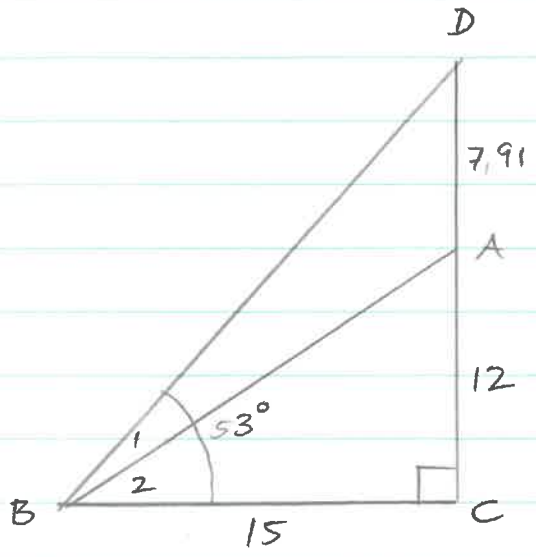
sum ^'s in $\Delta = 180^\circ$

$\therefore \hat{C} = 90^\circ - \theta$

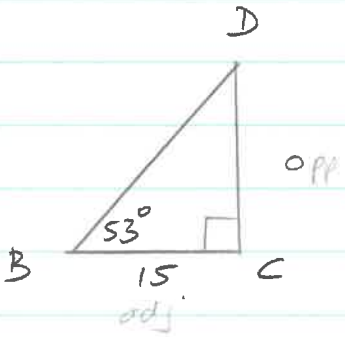
$\therefore \tan\hat{C} = \frac{o}{a}$

$= \frac{2}{\sqrt{5}}$ ✓ 1

4.5.



4.5.1. Δ DBC :



$\tan 53° = \frac{CD}{15}$ ✓

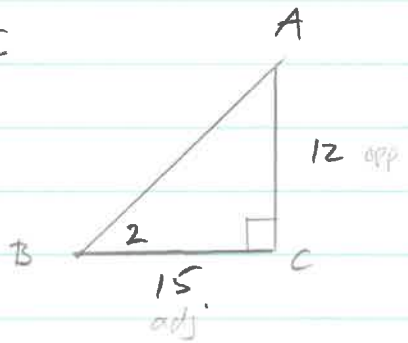
$15 . \tan 53° = CD$

✓ $19,90\ldots =$

$\therefore AD = 19,90\ldots - 12$

$= 7,91$ cm ✓ 3

4.5.2. Δ ABC



$\tan \hat{B}_2 = \frac{12}{15}$ ✓

$\hat{B}_2 = \tan^{-1}\left(\frac{12}{15}\right)$

$= 38,65\ldots°$ ✓

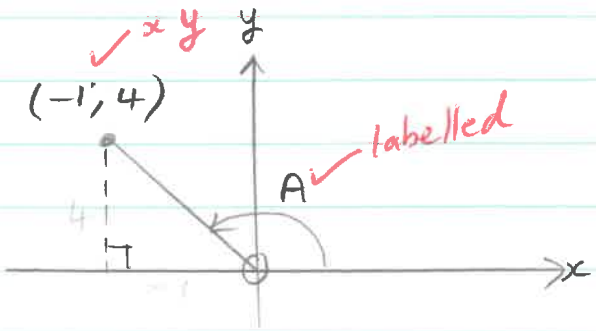
$\therefore \hat{B}_1 = 53° - 38,65\ldots°$

$= 14,34°$ ✓ 3

4.6. $\tan A + 4 = 0$ $\quad \sin A > 0$

$\tan A = -4$ $\quad \sin A +$

Q II IV $\quad$ Q I II



$\frac{-4}{1} = \frac{y}{x} = \frac{4}{-1}$

$(-1)^2 + (4)^2 = r^2$ Pythag

$17 = r^2$

$\pm\sqrt{17} = r$ reject −

$\sqrt{17} = r$ ✓

$\therefore \sqrt{1 - \sin^2 A}$

$= \sqrt{1 - (\sin A)^2}$

$= \sqrt{1 - \left(\frac{y}{r}\right)^2}$

$= \sqrt{1 - \left(\frac{4}{\sqrt{17}}\right)^2}$

$= \sqrt{1 - \frac{16}{17}}$ ✓

$= \sqrt{\frac{1}{17}}$ ✓ 6