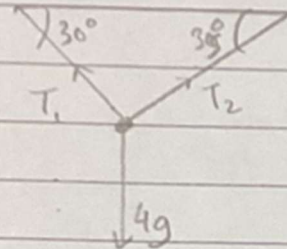The following gives some examples of the level of work covered in Mathematics in Key Stage 5 including details of how we expect students to set out their work and engage with feedback received.

Classwork and homework

Resolving forces method

14/10/24

> Correct notation used.

$$(R\uparrow) \quad 4g = \frac{T_1}{2} + \frac{T_2 \sin 35}{2}$$

$$(R\rightarrow) \quad T_1 \cos 30 = T_2 \cos 35$$

$$T_1 = \frac{T_2 \cos 35}{\cos 30}$$

> The student has paid careful attention to the structure and clarity of their work.
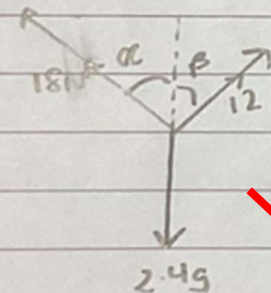
$$4g = \left(\frac{\cos 35}{2\cos 30} + \sin 35\right) T_2$$

$$T_2 = 37.5 N$$
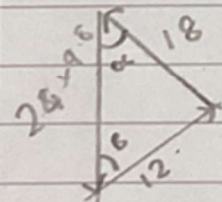$$T_1 = 39.5 N$$

6)

$$(R\uparrow) \quad 18\cos\alpha + 12\cos\beta = 2.4 \times 9.8$$
$$(R\rightarrow) \quad 18\sin\alpha = 12\sin\beta$$
$$\alpha = \sin^{-1}\left(\frac{2}{3}\sin\beta\right)$$

> Diagrams have been drawn clearly with pencil and ruler. This is particularly important for Mechanics and graphs in Pure and Statistics.

$$\frac{12}{\sin\alpha} = \frac{18}{\sin\beta} = \frac{2.4 \times 9.8}{\sin(\alpha+\beta)} = \frac{2.4 \times 9.8}{\sin}$$

$$144 = (2.4\times 9.8)^2 \times (18)^2 - 2.4\times 9.8 \times 18\cos\alpha$$
$$\alpha = 30°$$

> Work is checked and self-marked by students for routine class work.

Teacher assessed work

Targets are either written out or numbered. A score is given. Students are expected to show their engagement with this target in their "follow up" work.

$\frac{15}{20}$

1a. Machinist

Amy

0.4

0.35 — Brad

0.25 — Cen

Let F ~ Faulty

0.05 — F
0.95 — F'
0.02 — F
0.98 — F'
0.03 — F
0.97 — F'

(T4) Conditional Probability w/ Venn Diagram

③

b. $P(B \cap F') = 0.35 \times 0.98$
$= 0.343$ ②

c. $P(F') = P(A \cap F) + (0.4 \times 0.05) + (0.35 \times 0.02) + (0.25 \times 0.03)$
$= 0.0345$ ②

Normal dist. not appropriate. Why? She has no reason to believe that the sizes of LAPs normally distributed

③ $\Phi(k) = 0.7 \rightarrow P(X < k) = 0.7$
$\therefore k = \Phi^{-1}(0.7) = 0.5244$
$\therefore 2k = 1.0488$

$\Phi(k) = 0.7$
$\therefore k = 0.5244$
$\therefore 2k = 1.0488$
$\Phi(2k) = \Phi(1.0488) = 0.8529$

$P(X > k) = 0.3$
$k = 0.525$
$\therefore 2k = 1.05$
$\therefore \Phi(1.05) = 0.147$

$1 - 0.146 = 0.853$ ✓ ②

Students respond to written teacher comments and make corrections accordingly.

$up: ①$ (b) $A \sim N(\mu, \sigma^2)$
$P(A < 110) = 0.3875$ $\qquad$ $P(A > 113) = 0.2835$
$\Phi^{-1}(0.3875) = -0.2858 = \frac{110 - \mu}{\sigma}$ $\qquad$ $\Phi^{-1}(0.7165) = 0.5725 = \frac{113 - \mu}{\sigma}$

$-0.2858\sigma + \mu = 110$ $\qquad$ $0.5725\sigma + \mu = 113$
$\sigma = 3.495 = 3.50 (3sf)$ $\quad \mu = 110.99 = 111 (3sf)$

Extension follow-up

⑤ $f(x) = x^2 + 4ax + a^2$ $g(x) = 4x - 2a$

(a) range of $f(x)$

$f(x) = (x+2a)^2 - 4a^2 + a^2$

$f(x) = (x+2a)^2 - 3a^2$

$f(x) \geqslant -3a^2$ ✓

(b) $f(g(3)) = 69$

$f(g(x)) = f(4x-2a)$

$f(g(x)) = (4x-2a)^2 + 4a(4x-2a) + a^2$

$f(g(x)) = 16x^2 - 16ax + 4a^2 + 16ax - 8a^2 + a^2$

$f(g(x)) = 16x^2 - 3a^2$

$16x^2 - 3a^2$ $f(g(3)) = 69$

$\therefore$ $16(3)^2 - 3a^2 = 69$

$3a^2 = 144 - 69$

$a^2 = 25$

$a = \pm 5$ as $a > 0$

$g^{-1}(x) = x$

$y = 4x - 2a$

$x = 4y - 2a$

$y = \dfrac{x+2a}{4}$ $\therefore g^{-1}(x) = \dfrac{x+2a}{4}$ $\therefore \dfrac{x+2a}{4} = x$

$4x = x + 2a$

$3x = 2a$

$\therefore x = \dfrac{2}{3}a$

$\therefore x = \dfrac{2}{3}(5) = \dfrac{10}{3}$