Assessing students’ work

The following descriptions indicate typical levels of performance. After each description is an example of some work at this level.

Little progress

- **Representing:** Selects some key information and performs relevant calculations.
- **Analysing:** Makes accurate calculations for at least one of the methods at 20º C.
- **Interpreting and evaluating:** Attempts to interpret findings in the original context. E.g. States whether Anne’s calculation is too high or low and by how much.
- **Communicating and reflecting:** Presents findings clearly but these are incomplete and contain errors.

Sample response: Hardip

Hardip correctly calculates the temperature in degrees Fahrenheit using John’s rule.
He makes an error using Anne’s rule

① John
20 × 9 = 180 ÷ 5 = 36 + 32 = 68

Anne
20 × 2 = 60 + 30 = 90

The Fahrenheit will be 68 fahrenheit
Anne's method leaves her 22 fahrenheit higher then it should be.

② Anne gives an answer which is too high when the temperature is 20°C.

Questions for Hardip:

Hardip could be encouraged to improve his response by asking the following questions:

- *Can you explain to me how you used Anne’s method when the temperature is 20 degrees Centigrade?*
- *What are you asked to find out in the second question? What other temperatures could you try to see if Anne’s method always gives too high a temperature?*

Some progress

- **Representing:** Selects some key information and performs relevant calculations.
- **Analysing:** Makes some accurate calculations at 20º C and for at least one other temperature.
- **Interpreting and evaluating:** Interprets findings in the original context. E.g. States whether Anne's calculation is too high or low and by how much.
- **Communicating and reflecting:** Presents findings clearly but these are incomplete and may contain errors.

Sample response: Bhasha

Bhasha correctly calculates the temperature in degrees Fahrenheit using both John's rule and Anne's rule. He makes calculations using both rules for 100°C and states that Anne's method gives an answer that is too high.

1. $20° \times 9 = \frac{180}{5} = 36 + 32 = 68\,°F$

Anne: $20 \times 2 = 40 + 30 = 70$

Anne's method is ~~more~~ rounded up whereas John's is more precise.

2. 100° – the temperature of boiling water!

By Johns method: 212°F

By Annes method: 230°F

This is by far inaccurate so is too high.

Questions for Bhasha:

Bhasha could be encouraged to improve this response by asking the following questions:

- *What are you asked to find out in the second question? What other temperatures could you try to see if Anne's method always gives too high a temperature?*
- *How might you approach this in an organised way?*

Substantial progress

- **Representing:** Selects a systematic way of comparing the two methods.
- E.g. using algebra, a table or a graph. Method may not be efficient.
- **Analysing:** Explores the effect of varying the temperature. Makes accurate calculations or graphs, recording systematically.
- **Interpreting and evaluating:** Interprets tables or graphs to begin to solve the problem, relating findings to the original context.
- **Communicating and reflecting:** Communicates reasoning and findings clearly.

Sample response: Beth

Beth correctly calculates the temperature in degrees Fahrenheit using both John's rule and Anne's rule for 20 degrees Celsius. She makes many calculations using both rules, but her method, though systematic, is very long-winded and she needs to find a more efficient searching strategy. She is not yet relating her findings to the context, at least explicitly.

① 20×9 = 180÷5 = 36+32 = 68°f

20+20 = 40+30 = 70°f

Anne is 2 degrees fahrenneit off.

② lets sey 50

50×9 = 450÷5 = 90+32 = 122°f

50×2 = 100+32 = 132 — 50 is too high

Sey 45

45×9 = 405÷5 = 81+32 = 113

45×2+30 = 120 — 45 is still too high

42×9 = 378÷5 = 75.6+32 = 107.6

42×2 = 84+30 = 114 — 42 is still too high

Sey 41

41×9÷5 = 73.8+32 = 105.8

41×2 = 82+30 = 112

Sey 40

40×9 = 360÷5 = 72+32 = 104

40×2 = 80+30 = 110

39×9÷5 = 70.2+32 = 102.2

39×2+30 = 108

38×9÷5 +32 = 100.4

38×2+30 = 106

36×9÷5+32 = 96.8

36×2+30 = 102

34×9÷5+32 = 93.2

34×2+30 = 98

32×9÷5+32 = 89.6

32×2+30 = 94

30×9÷5+32 = 86

30×2+30 = 90

28×9÷5+32 = 82.4

28×2+30 = 86

26×9÷5+32 = 78.8

26×2+30 = 82

25×9÷5+32 =

Questions for Beth:

Beth could be encouraged to improve her response by asking the following questions:

- *You have tried a number of temperatures working down from 50 to 25 and found that for each of them Anne's method gives too high a value. What other Celsius temperatures could you try?*
- *Can you think of a more efficient approach to compare the methods John and Anne used?*

Task accomplished

- **Representing:** Selects an efficient way of comparing the two methods. E.g. using algebra, a table or a graph.
- **Analysing:** Explores the effect of varying the temperature. Makes accurate calculations or graphs, recording their methods systematically. Deduces when the approximate method gives an answer that is too high.
- **Interpreting and evaluating:** Interprets calculations, tables or graphs to solve the problem, relating their findings to the original context.
- **Communicating and reflecting:** Communicates reasoning and findings clearly and succinctly.

Sample response: Jake

Jake correctly calculates the temperature in degrees Fahrenheit using both John's rule and Anne's rule for 20 degrees Celsius. He then systematically compares the differences between the two methods for 30°, 10° and 0°. This, together with his result for the first part, reveals a linear pattern in the differences that suggests his conclusion. His solution is thus efficient and correct.

1) John
20° × 9 = 180°C
180°C ÷ 5 = 36°C
36°C + 32 = 68°F

Anne
20°C × 2 = 40°C
40°C + 30 = 70°F

Anne is 2°F too high.

2)

~~30~~	John	Anne	
30°C	86°F	90°F	+4°F
20°C	68°F	70°F	+2°F
10°C	50°F	50°F	0°F
0°C	32°F	30°F	-2°F

30×9 = 270
270÷5 = 54
54+32 = 86
30×2 = 60
60+30 = 90

10×9 = 90
90÷5 = 18
18+32 = 50
10×2 = 20
20+30 = 50

0×9 = 0
32

This table shows Anne's method is higher for temperatures over 10°C.

Questions for Jake:

Jake could be encouraged to improve his response by asking the following questions:

- *Can you think of an algebraic or graphical approach to this problem?*
- *When would you recommend each of your methods?*