Factor Analysis for the Questions

|  |  |  |
| --- | --- | --- |
| Questions | Factor 1 | Factor 4 |
| Q8 |  | 0.31 |
| Q11 | 0.7 |  |
| Q12 |  | 0.38 |
| Q13 | 0.68 |  |
| Q15 | 0.36 | 0.359 |
| Q16 | 0.82 |  |
| Q17 |  | 0.8 |
| Q18 | 0.94 |  |
| Q19 | 0.93 |  |
| Q24 |  | 0.27 | |

Reliability analysis

Call: alpha(x = Pre\_CC\_Q)

lower alpha upper 95% confidence boundaries

0.68 0.72 0.75

Reliability if an item is dropped:

Item statistics

Non missing response frequency for each item

0 1 miss

Q8 0.24 0.76 0.01

Q11 0.61 0.39 0.01

Q12 0.28 0.72 0.01

Q13 0.61 0.39 0.01

Q15 0.29 0.71 0.09

Q16 0.66 0.34 0.01

Q17 0.22 0.78 0.01

Q18 0.53 0.47 0.01

Q19 0.49 0.51 0.01

Q24 0.55 0.45 0.01

|  | **raw\_alpha**  <dbl> | **std.alpha**  <dbl> | **G6(smc)**  <dbl> | **average\_r**  <dbl> | **S/N**  <dbl> | **ase**  <dbl> | **mean**  <dbl> | **sd**  <dbl> |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.7184224 | 0.7094004 | 0.7442481 | 0.1962165 | 2.441161 | 0.01745082 | 0.5491319 | 0.2511318 |  |

| **raw\_alpha**  <dbl> | **std.alpha**  <dbl> | **G6(smc)**  <dbl> | **average\_r**  <dbl> | **S/N**  <dbl> | **alpha se**  <dbl> | **var.r**  <dbl> | **med.r**  <dbl> |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Q8 | 0.7300648 | 0.7230995 | 0.7564233 | 0.2249000 | 2.611405 | 0.01688139 | 0.04131917 | 0.1532343 |
| Q11 | 0.6605187 | 0.6521784 | 0.6816833 | 0.1724166 | 1.875037 | 0.02139999 | 0.02786977 | 0.1209360 |
| Q12 | 0.7327117 | 0.7232631 | 0.7513249 | 0.2250425 | 2.613540 | 0.01652624 | 0.03946205 | 0.1467428 |
| Q13 | 0.6758251 | 0.6670246 | 0.7018669 | 0.1820580 | 2.003225 | 0.02040736 | 0.03088128 | 0.1268343 |
| Q15 | 0.7027404 | 0.6919574 | 0.7320174 | 0.1997371 | 2.246305 | 0.01844620 | 0.04497924 | 0.1121404 |
| Q16 | 0.6493461 | 0.6394328 | 0.6720786 | 0.1646098 | 1.773408 | 0.02213186 | 0.02651068 | 0.1209360 |
| Q17 | 0.7261184 | 0.7186710 | 0.7463019 | 0.2210865 | 2.554557 | 0.01695453 | 0.04057779 | 0.1525309 |
| Q18 | 0.6612819 | 0.6535416 | 0.6848549 | 0.1732766 | 1.886349 | 0.02137779 | 0.03021521 | 0.1209360 |
| Q19 | 0.6775173 | 0.6682572 | 0.7017930 | 0.1828866 | 2.014384 | 0.02024051 | 0.03627335 | 0.1195658 |
| Q24 | 0.7250149 | 0.7127931 | 0.7476311 | 0.2161515 | 2.481811 | 0.01701914 | 0.04314780 | 0.1334584 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q | Dffclt. | Dscrmn | Question | Comments |
| Q8 | -3.812 | 0.330 | Q8 The formula for calculating density is ------- | The question has low discrimination and difficulty below the mean. |
| Q11 | 0.245 | 3.486 | Q11 The density of 1 kg of aluminium  is ...  the density of 10 kg of aluminium |  |
| Q12 | -21.285 | 0.045 | Q12 What happens to the volume of a block of wood when you cut into two halves, and examine one of these halves? | The question showed to be very easy for the students, as the difficulty score is very low. |
| Q13 | 0.292 | 2.377 | Q13 The density of 2L cube of wood is .... the density of 200L cube of the same wood |  |
| Q15 | -1.237 | 0.873 |  | Loaded equally on both factors |
| Q16 | 0.374 | 5.013 | The density of 2 kg of wood is: |  |
| Q17 | -8.709 | 0.147 | Q17 What happens to the mass of an object when you cut it in half and examine one of these halves? |  |
| Q18 | 0.057 | 3.127 | Q18 What happens to the density of an object when you cut it in half and examine one of these halves? |  |
| Q19 | -0.095 | 1.883 | If you cut a block of wood into two halves, how can you describe one of these halves: |  |
| Q24 | 0.623 | 0.344 | When mercury rises in a thermometer, it becomes -------- compared to its state before it rose |  |

Q8 The formula for calculating density is -------

* volume/mass (1)
* mass/volume (2)
* mass X volume (3)

Q9 The density of a substance cannot change (at the same temperature and pressure)

* Agree (1)
* Disagree (2)
* Not sure (3)

Display This Question:

If The density of a substance cannot change (at the same temperature and pressure) != Not sure

Q10 Please explain your answer to the previous question

* Because density is a property of the matter, and it can never change (1)
* Because the density can always change even if the pressure or temperature is constant (2)
* Because density is a property of the matter, and it can change only if we changed the temperature or pressure (3)

Q11 The density of 1 kg of aluminium  is ...  the density of 10 kg of aluminium

* Bigger than (1)
* Same as (2)
* Smaller than (3)

Q12 What happens to the volume of a block of wood when you cut into two halves, and examine one of these halves?

* it has half the volume of the original block (1)
* it has twice the volume of the original block (2)
* it has the same volume as the original block (3)

Q13 The density of 2L cube of wood is .... the density of 200L cube of the same wood

* Bigger than (1)
* Same as (2)
* Smaller than (3)

Q14 Heavy things will always sink, and light things will always float in water.

* Agree (1)
* Disagree (2)
* Not sure (3)

Display This Question:

If Heavy things will always sink, and light things will always float in water. != Not sure

Q15 Please explain your answer to the previous question

* Because what determines if an object will sink or float is the volume (how big it is) (1)
* Because what determines if an object will sink or float is the weight of the object (2)
* Because what determines if an object will sink or float is the density of the object compared to the density of water. (3)

Q16 The density of 2 kg of wood is:

* Twice the density of 1 kg of wood (1)
* Half the density of 1 kg of wood (2)
* The same density as 1 kg of wood (3)

Q17 What happens to the mass of an object when you cut it in half and examine one of these halves?

* it has half the mass of the original block (1)
* it has twice the mass of the original block (2)
* it has the same mass as the original block (3)

Q18 What happens to the density of an object when you cut it in half and examine one of these halves?

* it has half the density of the original block (1)
* it has twice the density of the original block (2)
* it has the same density as the original block (3)

Q19 If you cut a block of wood into two halves, how can you describe one of these halves:

* it has the same volume, but half the density of the original block (1)
* It has half the volume, but same density of the original block (2)
* It has half the volume, and half the density of the original block (3)

Q20 When you throw a 5 kg block of material (X) in water it sinks, what would happen if you cut this same block into smaller blocks of 1 kg and threw them in water?

* The blocks will float (1)
* The blocks will sink (3)
* I am not sure (4)

Q21 When you throw a 2 kg of wood in water it floats. If you attached this block to another block of the same wood weighing 4 kg (to have a total of 6 kg) and throw them in water, what would happen?

* The 2 blocks will float (1)
* The 2 blocks will sink (2)
* I am not sure (3)

Q22 What determines if the object will sink or float

* Volume only (1)
* Mass only (2)
* Density (3)
* Another answer? (4)

Display This Question:

If What determines if the object will sink or float = Another answer?

Q23 Please explain:

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Q24 When mercury rises in a thermometer, it becomes -------- compared to its state before it rose

* Less dense (1)
* More dense (2)
* Same density (3)