

Lösungen

Zum Buch **Technical English - Civil Engineering and Construction**

Europa-Nr. 41364, 1. Auflage



Module 1: Mathematics

1.1 Numbers and Simple Calculations

Task 1

twenty-one; one hundred and five; four thousand, four hundred and forty-four

Task 2

Verschiedene Lösungen sind möglich. Die Schreibweise richtet sich nach den ausgesuchten Beispielen.

1. 2, 4, 6; 2. 1, 3, 5; 3. 13, 17, 23; 4. 16, 25, 49; 5. 64, 125, 216

Task 3

1. eighty-two; 2. eleven point three kilograms per cubic decimetre; 3. three hundred and twenty-seven degrees Celsius; 4. thirty-five point two watts; 5. from ten to twenty newtons per square millimetre; 6. from seven to eight megapascals; 7. seventeen point five gigapascals; 8. maximum fifty per cent

1.2 Fractions, Powers, Roots

Task 1

1. d; 2. i; 3. a; 4. j; 5. h; 6. f; 7. c; 8. e; 9. g; 10. b; 11. l; 12. k; 13. n; 14. m

Task 2

1. five plus four equals / is equal to nine; 2. forty-five minus five equals forty; 3. fifty times (or: fifty multiplied by) five equals two hundred and fifty; 4. fifty-five divided by five equals eleven; 5. two and three quarters; four and two ninths; 6. the square root of four; the third root of twenty-seven; the fourth root of sixteen; 7. x squared; x to the power of three (x cubed); x to the power of four ; x to the power of n

1.3 Geometry

Task 1

1. ... a right angle; 2. ... flat angle; 3. ... acute angle; 4. ... reflex angle; 5. ... obtuse angle

Task 2

The sum of the areas of the squares on the two sides equals the area of the square on the hypotenuse.

Task 3

1. equilateral triangle (gleichseitig); 2. scalene triangle (ungleichseitig); 3. isosceles (gleichschenkelig) triangle

Task 4

2-D Shapes	3-D Shapes
square	cube
hexagon	cone
polygon	cylinder
rectangle	prism
triangle	pyramid
	sphere

Task 5

1. ruler; 2. a pair of compasses; 3. protractor

Task 6

1. Umfang; 2. Durchmesser; 3. Halbkreis; 4. Tangente; 5. Sekante; 6. Kreisabschnitt; 7. Kreisabschnitt; 8. Sehne; 9. Bogen

Task 7

1. circumference; 2. arc; 3. radius; 4. diameter; 5. sector; 6. semicircle; 7. chord; 8. segment

Module 2: Physics

2.1 Important Physical Quantities

Task 1

1. density;
2. volume; volume;
3. mass;
4. mass;
5. mass;
6. density

Task 2

Quantity	measured in	formula	in full
energy	joules	$E = q \cdot V$	energy equals charge times voltage
pressure	pascals	$P = F / A$	pressure equals force per area
work (done)	joules	$W = F \cdot d$	work (done) equals force times distance
force	newtons	$F = m \cdot a$	force equals mass times acceleration
power	watts	$P = W / t$	power equals work (done) per time
frequency	hertz	$f = 1 / t$	frequency equals one per time period
resistance	ohms	$R = V / I$	resistance equals voltage divided by current
potential difference	volts	$V = I \cdot R$	voltage equals current times resistance

Task 3

1. With its 11.3 kg/dm^3 lead is the densest material in the table.
2. Reinforced concrete is less dense than aluminum, but it is denser than water.

Task 4

2. Glass is not as dense as steel.
3. Porous concrete is the least dense material.

Verschiedene Lösungen sind möglich, hier nur Beispiele

2.2 Mechanical Properties of Solid Building Materials

Task 1

1. elasticity;
2. ductility;
3. plasticity;
4. brittleness;
5. toughness

Task 2

hard	soft	tough	brittle	elastic	plastic
<ul style="list-style-type: none"> • granite • hardened steel 	<ul style="list-style-type: none"> • lead • gypsum 	<ul style="list-style-type: none"> • lead • hardened steel 	<ul style="list-style-type: none"> • glass • concrete 	<ul style="list-style-type: none"> • rubber • spring steel 	<ul style="list-style-type: none"> • mortar • lead • clay

Task 3

1. As/since hardness as well as strength are important mechanical properties of a material, they have to be tested in a laboratory in advance.
2. Although glass is very brittle and breaks easily, it is a common/an often used material in civil engineering.

Task 4

1. As; 2. but; 3. Neither; nor

Task 5

Verschiedene Lösungen sind möglich. Task 2 kann zu Hilfe genommen werden.

2.3 Forces and Loads

Task 1

1. j ; 2. f ; 3. a ; 4. b ; 5. g ; 6. i ; 7. d ; 8. e ; 9. h ; 10. c

Task 2

1. / , / ; 2. The; 3. / ; 4. The, the, the; 5. The, /

Module 3: Chemistry

3.1 Bodies, Substances, Elements

Task 1

Limestone (CaCO_3) is burnt and processed in a lime kiln or rotary kiln.

Carbon dioxide is released.

The end-product of the process is CaO which is needed as quicklime in the building industry.

Task 2

1. lime; 2. slaked lime; 3. limestone; 4. lime mortar; 5. quicklime

Task 3

1. Elements: individual, single substances; normally cannot be separated; H; O
2. Compounds: consist of at least two different elements; can be separated; H_2O
3. Mixtures: consist of different substances and materials; lime mortar = sand, water, lime; can be separated

Task 4

1. c; 2. a; 3. b

Task 5

1. Neither physical or chemical nor other processes can separate chemical elements.
2. Since/As mixtures consist of different materials, they can be separated either by chemical or physical processes.
3. Neither process is easy to carry out.

3.2 Basic Elements and their Compounds

Task 1

1. carbon;
2. hydrogen;
3. oxygen;
4. potassium;
5. calcium;
6. silicon;
7. aluminium;
8. iron,
9. manganese

Task 2

1. calcium oxide;
2. calcium oxide, silicon oxide;
3. carbon, silicon, manganese;
4. carbon;
5. PVC, polyvinyl chloride;
6. iron

Task 3

1. Sulphur reacts with oxygen to become sulphur dioxide.
2. Heat reduces the oxygen state of mercury oxide to become mercury (Hg).

Task 4

1. c;
2. b;
3. a

Task 5

1. Evaporation: the transfer from the liquid state into the gaseous state
2. Condensation: the transfer from the gaseous state into the liquid state
3. Precipitation: any kind of rain from hail to sleet etc.

Task 6

siehe Picture 1: The Water Cycle

Task 7

1. b ;
2. a ;
3. c

Task 8

1. Elements are single substances which cannot be separated.
2. Compounds are at least two different elements.

3. Metals are ... (verschiedene Möglichkeiten)
4. Oxidation means the chemical reaction with oxygen (gaining oxygen).
5. Carbon dioxide is ... (verschiedene Möglichkeiten).
6. Reduction means a reaction where the oxygen content decreases.

3.3 Corrosion, Corrosion Behaviour and Protection

Task 1

1. false; 2. true; 3. true; 4. false; 5. true; 6. true

Task 2

1. Unalloyed steels only resist corrosion in dry areas.
4. Copper and its alloys are more resistant in dry air than in sea ambience.

Task 3

(1) dissimilar; (2) moist; (3) insulating layer; (4) lacquer; (5) surface; (6) rust;
(7) metallic coatings

Task 4

corrosive; resistant; protective; destructive; preventive; conductive; insulating

Task 5

1. Preventive measures serve as a protection against corrosion.
2. Copper is a conductive material for heat and electricity (current).
3. Destructive and non-destructive testing is a method to test / examine the properties of materials.

Module 4: Building Materials

4.1 Industrial Minerals

Task 1

1. b; 2. c; 3. d; 4. e; 5. a

Task 2

Types	Definition	Example
sedimentary	These rocks were formed from the remains of animals or plants and other rocks which had been crushed together.	shale, sandstone, limestone, coal
igneous	These rocks were formed when hot, molten volcanic materials cooled and solidified.	basalt, granite, lava
metamorphic	These rocks were once igneous or sedimentary and were changed by great heat and pressure.	slate, marble

Task 3

Weather resistance of natural stones highly depend on the porosity of stones. Sandstone e.g. can suck in a high amount of water. They can be destroyed by weathering and freezing. Changing temperatures can cause cracks where water can enter. Acid rain as well as roots of plants can destroy natural stones as well.

Task 4 Grammar Exercise

①created; ②originate; ③change; ④are; ⑤have been; ⑥have; ⑦make; ⑧is; ⑨is; ⑩have used

Task 5

1. Inner and outer forces cause movements inside the Earth, thus changing/metamorphosing the rocks.
2. As igneous rock, granite and basalt possess/have very good mechanical and physical properties which make them a commonly used building material.
3. The amount and composition of minerals determine the properties of the rocks.
4. Special optical features have (ever since) been a criterion for choosing rocks as a building material (ever since).

4.2 Cement, Mortar, Concrete and Aggregate

Task 1

1. Concrete is a man-made building material used in different types of constructions.
2. Concrete is made of cement and aggregates of a particular grain size distribution mixed with water.
3. Adding water initiates the setting reaction between it and the cement, thus binding the whole mass together.

Task 2

1. true; 2. false; 3. true; 4. true

Task 3

- ①sprayed; ②increase; ③stiffness; ④application; ⑤loads; ⑥viscosity; ⑦ordinary

Task 4

1. We make concrete by mixing cement with sand, water and rock pieces/gravel.
2. Mortar is made of cement, sand and water and it is used to bond bricks and building blocks together (or: to fill the gaps between them).
3. Concrete can be reinforced with steel to strengthen the material (or: to enable the material to hold bigger loads).

Task 5

1. I think (that) we will start / are going to start concrete workings tomorrow.
2. If it doesn't rain tomorrow, we will be able to visit the construction site.
3. The de-icing salt will easily/ quickly melt the snow.
4. If concrete absorbs salt, a high osmotic pressure will be generated.
5. The high pressure will cause cracks to appear on the motorway.

4.3 Ferrous and Non-Ferrous Metals

Task 1

Steel: mild steel; tool steel; stainless steel

Cast Iron: wrought iron

Heavy Metals: copper; lead; chromium; nickel; zinc

Light Metals: aluminium; magnesium; titanium

Task 2

1. true; 2. true; 3. true; 4. false; 5. false; 6. true; 7. false; 8. true

Task 3

1. lead; 2. copper; 3. aluminium; 4. silver; 5. wrought iron

Task 4

1. Metals are divided into ferrous and non-ferrous metals.
2. In blast furnaces, pig iron is produced by combustion.
3. Hot air is injected to improve combustion.
4. Slag is needed as a binding agent for the construction industry.
5. Exhaust gases rise to the top of the furnace and are released.

Task 5

1. Non-ferrous metals can be divided into light and heavy metals.
2. Iron ores are the basics for producing pig iron / are chemically bonded elements of iron and other elements
3. Liquid pig iron is tapped off for further processing.
4. Slag is a by-product of producing pig iron.
5. A blast furnace is a huge structure for combustion.

Verschiedene Lösungen sind möglich.

Task 6

1. is heated; 2. are made; 3. are released; 4. are bonded; 5. are needed

4.4 Steel, Production, Composition and Application

Task 1

Zur Beantwortung dem Text folgen.

Task 2

Dem Beispielsatz folgen; Informationen sind der Tabelle zu entnehmen.

Task 3

1. c; 2. b; 3. a; 4. e; 5. f; 6. d

Task 4

1. **normalizing**; 2. low; 3. high; 4. properties; 5. bend; 6. quenching; 7. Bunsen burner; 8. degrees; 9. quench; 10. brittle; 11. ductility; 12. tempering; 13. heat treatment; 14. restores; 15. moderate; 16. high

Task 5

1. If you melt iron into liquid pig iron, you can tap it off at the blast furnace (it can be tapped off).
2. If you quench a steel sample with water, it gets (will get) brittle.
3. You need to improve the mechanical and physical properties of steel, if you want to increase the workability and to reduce the wear of tool steels.
4. If the demand for steel continually rises as in the past, the prices for scrap metal will also rise.
5. If the impurities hadn't been removed during the melting process, the total steel production would have been eliminated.

Module 5: The Construction Site

5.1 Health and Safety on the Construction Site

Task 1

1. f; 2. c; 3. b; 4. e; 5. a; 6. d

Task 2

mask: A mask is necessary as a dust filter or to avoid inhaling gases or vapours.

gloves:
machines. Gloves are to protect the hands from chemicals or from being hurt by

goggles: Goggles are used to protect the eyes from flames, sparks, paint or acid spray.

ear plugs/ear protection: Ear plugs are necessary if noise levels are too high.

safety boots: Safety boots are needed to protect the feet from falling objects; from bumping against something hard.

Task 3

1. d; 2. a; 3. b; 4. f; 5. e; 6. c

Task 4

IP X1	<u>drip-water protection</u>	IP X6	<u>pressure water protection</u>
IP X3	<u>spray-water protection</u>	IP X8	<u>water-proof</u>
IP X4	<u>splash-water protection</u>	IP 5X	<u>dust protection</u>
IP X5	<u>jet-water protection</u>	IP 6X	<u>dust-tight</u>

Task 5

Example:

3. Wear your personal protective equipment at all times when working on a construction site to avoid injuries.

Verschiedene Lösungen sind möglich.

5.2 Geomechanics and Engineering Structures

Task 1

1. g ; 2. i ; 3. a ; 4. h ; 5. c ; 6. b ; 7. f ; 8. j ; 9. d ; 10. e ; 11. l ; 12. k

Task 2

1. C = air ; 2. B = water ; 3. A = mineral particles ; 4. D = organic particles

Task 3

1. c ; 2. g ; 3. j ; 4. i ; 5. a ; 6. o (i) ; 7. b ; 8. d ; 9. f ; 10. e ; 11. l ; 12. m ; 13. k ; 14. h ;
15. n

Task 4

organic

- humus
- peat
- mud

cohesive

- loam
- clay
- silt

granular

- sand
- gravel
- stones

Task 5

1. A careful analysis of geomechanical conditions/issues is the prerequisite to determine the load-bearing capacity of soils.
2. Sandy soils need a specific compaction.
3. Loamy soils can easily cause landslides.

Module 6: Energy

6.1 Energy Sources

Task 1

1. b; 2. c; 3. a

Task 2

1. boiler; 2. steam flow; 3. turbine; 4. condensed water pipe; 5. shaft; 6. generator; 7. transformer; 8. power lines; 9. pylons of the power grid

Task 3

1. d; 2. h; 3. a; 4. f; 5. b; 6. j; 7. g; 8. c; 9. i; 10. e

Task 4

Task 3 zur Hilfe nehmen.

Task 5

Antworten sind abhängig von der gewählten Energieressource.

Task 6

1. true; 2. true; 3. true; 4. false

4. Mögliche Argumente: Farmland is to be protected /sustainable agriculture is needed because
- farmlands/ food crops are a finite natural resource; - food crops are still necessary to mitigate the hunger in the world; - food shortages can cause price increases; - sustainable agriculture is necessary for the global climate (s. carbon cycle) etc.

6.2 Energy Efficiency in Buildings

Task 1

1. d; 2. a; 3. b; 4. c 5. e

Task 2

Many buildings are insufficiently insulated so that the energy escapes not only through the walls, but also through the windows.

Task 3

Electricity	Heating	Insulation	Illumination	Water
- use controllable timers	- use wood pellets to fire boilers	- use the right insulation material	- replace old bulbs with energy saving lighting	- collect rainwater for watering the garden
- replace old bulbs with energy saving lighting	- install heat recovery systems	- install double or triple glazed windows	- use daylight dependent times	- use water-stop systems
- install photovoltaic cells		- avoid thermal bridges		- reuse waste water for toilets
				- use appliances with low water consumption

Task 4

1. New building materials and modern technologies must carefully be selected regarding energy saving aspects.
2. Newly built housings/buildings commonly/often comply with current energy standards.
3. Smart technologies and other efficient measures support the savings of energy resources.
4. Insufficiently insulated houses increase energy costs for the owner. / Houses which are insufficiently insulated increase the energy costs for the owner.
5. Laws and regulations sustainably support energy saving measures.

Module 7: Surveying

7.1 Surveyors – Diversified Professionals

Task 1

1. c; 2. g; 3. i; 4. a; 5. j; 6. b; 7. h; 8. d; 9. l; 10. k; 11. e; 12. f; 13. n; 14. m

Task 2

1. Theodolite; 2. Level; 3. Total Station

Task 3

1. focusing screw; 2. horizontal tangent screw; 3. circular level; 4. prism;
5. collimation axis; 6. vertical axis; 7. foot screw; 8. base plate; 9. tripod

1. Vertikalkreis; 2. Kippachse; 3. Horizontrierlibelle; 4. Zielachse; 5. Stehachse; 6. Fernrohr;
7. Okular; 8. Horizontalkreis; 9. Stellschraube; 10. Grundplatte; 11. Stativ

7.2 Surveyors in Construction and Management

Task 1

1. Engineering surveyors have to comply their work with health and safety requirements.
2. They have to balance their engineering tasks with environmental and sustainability impacts.
3. Another major task is dealing with finance and making budget calculations.

Task 2

1. -knowing about surveying methods; -drawing to scale; -handle surveying instruments; (many more)
2. -knowing about structural integrity; -knowing about behaviour of building materials; -having mathematical knowledge, etc.
3. -having financial expertise; -knowing about project work, etc.

Task 3

1. d; 2. c; 3. a; 4. e; 5. b

Task 4

- ① drawing; ② advising; ③ conducting; ④ identify; ⑤ providing; ⑥ mapping; ⑦ process;
⑧ mentioning; ⑨ measuring; ⑩ drawing

Module 8: Jobs in the Building Industry

8.1 Authorities, People, Speciality Trades

Task 1

1. m; 2. h; 3. a; 4. p; 5. k; 6. q; 7. u; 8. b; 9. j; 10. i; 11. e; 12. s;
 13. c; 14. t; 15. r; 16. d; 17. v; 18. o; 19. l; 20. n; 21. g; 22. f

Task 2

structural	mechanical	finishing	managerial jobs
<i>bricklayers</i>	<i>plumbers</i>	<i>tilers</i>	<i>architects</i>
installer of external framework	electricians	carpenters	surveyors
iron and metal workers	heating installers	roofers	
		plasterers	
		dry wall installer	
		glazier	

Task 3

- A plumber installs, maintains, repairs pipe systems; he installs boilers or vessels to hold gases.
- An electrician installs, connects and maintains electrical systems.
- A carpenter is a craftsman who makes wooden structures.
- An architect makes the initial drawing of a proposed building, prepares tender documents, negotiates with contractors, etc.

Task 4

Dem Text in der Stellenanzeige folgen.

Task 5

1. Construction firms are urgently looking for well-trained skilled workers, especially for electricians and technicians for heating systems.
2. After his studies/ after having completed his studies, he wants to apply for a position as a project manager at an engineering office.
3. As a rule, construction firms make it a condition to agree to relocation.
4. If you work without a break, you will increase your health risk. / Working without a break will increase the health risk.
5. You need several bags of gravel a / (per)square metre.

8.2 Site Management - Construction Managers

Task 1

Picture 1, p. 115 gibt Hilfestellung zur Formulierung von Ideen.

Task 2

(1) commercial; (2) plants; (3) including; (4) workmanship; (5) landscape; (6) in charge of

Task 3

1. true 2. true 3. true

Task 4

1. True: Because the number of job openings will exceed the number of qualified individuals to enter the occupation. The building industry is expected to grow.
2. True: Academic skills are required for higher management jobs.
3. True: Because construction managers have to choose the best materials which are most cost-effective for the buildings. They have to make sure that the project gets done on time and within budget.

beispielhafte Lösungssätze

Task 5

1. Plumber; 2. Surveyors; 3. Authorities; 4. Jobs; 5. Heating; 6. Resources; 7. Architect;
 8. Metals; 9. Plants; 10. Accounting; 11. Electrician; 12. Budget; 13. Health;
 14. Materials; 15. Lösungswort: **Project Manager**