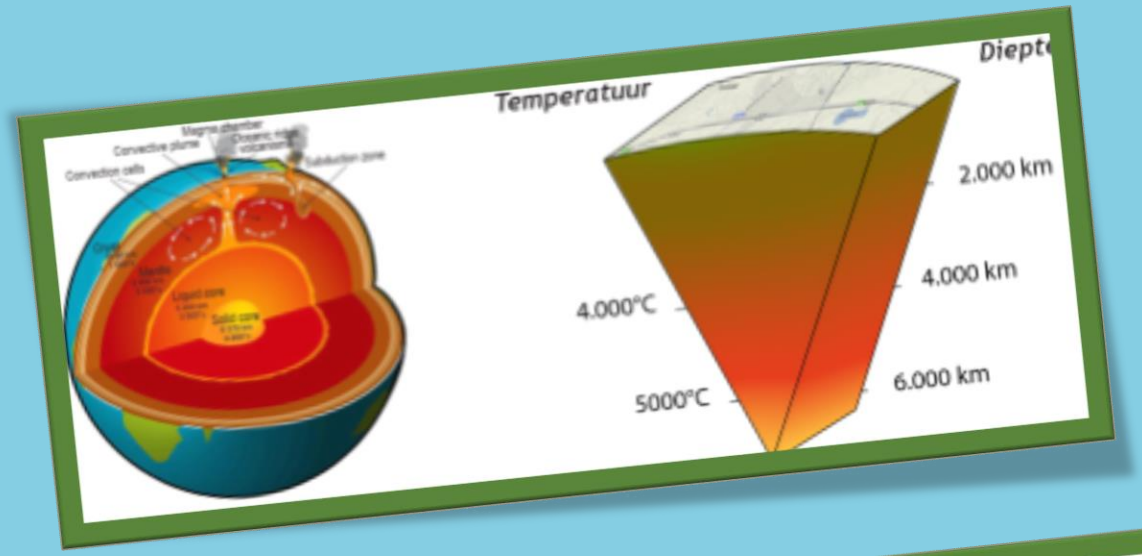
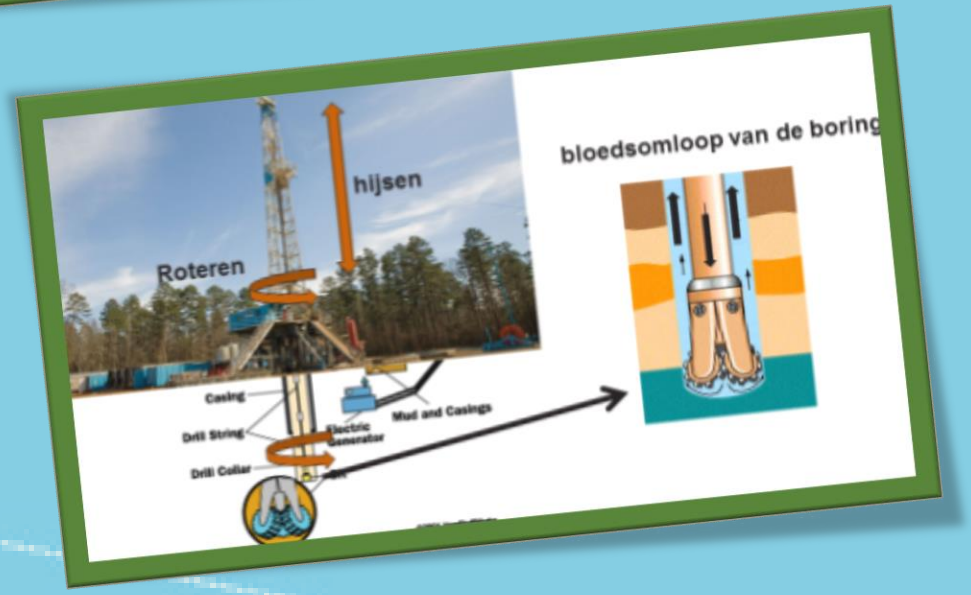
Heilig Graf *Turnhout - secundair onderwijs*

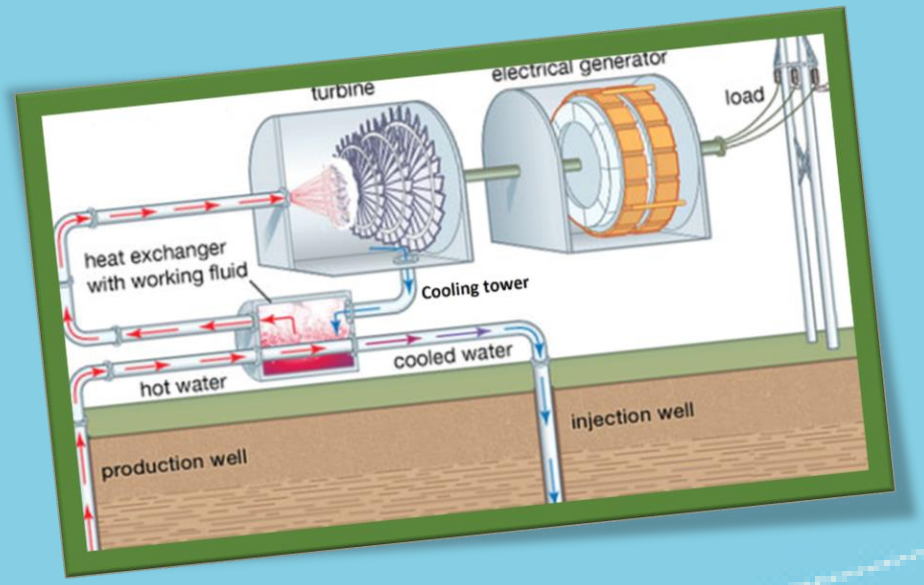
v o o r s p r o n g o p m o r g e n

VITO: Diepe geothermie in de Kempen: Tuinbouw en warmtenetten



- Reservoir op een diepte van 2.800 – 3.800 m
- Temperatuur: 124 °C
- Tot 5 boringen
- 130 – 165 kg/s
- Elektriciteitsproductie
- Warmtelevering op hoge en lage temperatuur





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Aardbeiteelt

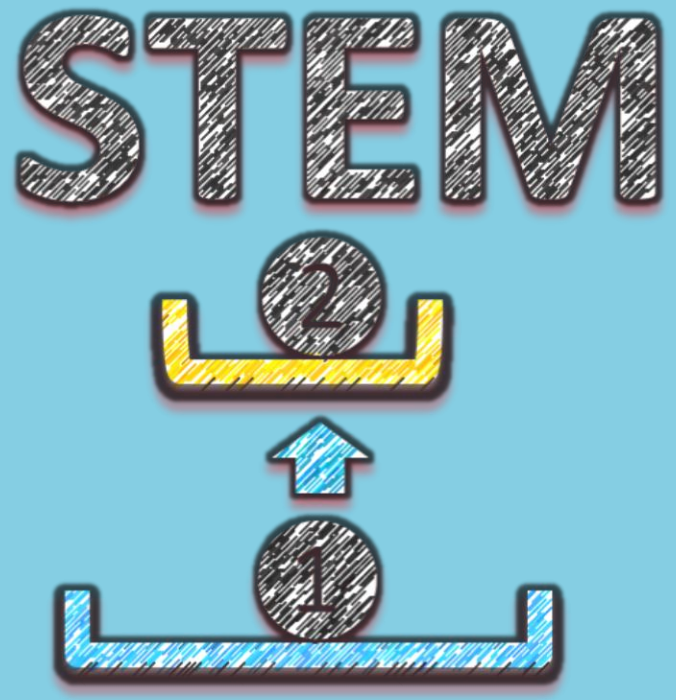
Opbrengstverhoging

1 WETENSCHAPPEN: groeivoorwaarden

==> WISKUNDIGE modellen

2 ONTWERP:

- Regeling: Kostverlaging optimalisatie: CO_2, temperatuur, voeding, belichting
- Automatisatie: arbeidskostverlaging.



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SCIENCE MATHEMATICS

Groeivoorwaarden:

Chemie:

- (kunst)mest: geleidbaarheid

Biologie

- Teelt : aardbei:
- CO_2 , licht (PAR), temperatuur, voeding

Fysica:

- Warmte
- Regelkringen

Aardrijkskunde:

- Bodemvruchtbaarheid: verhouding: water, voedingsstoffen, bodempartikels

Sturing/regeling serre

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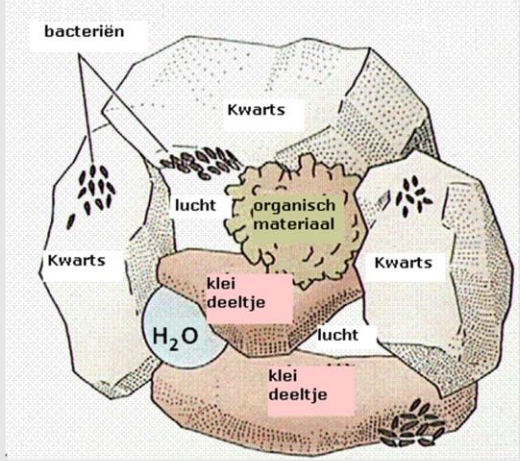
SCIENCE MATHEMATICS

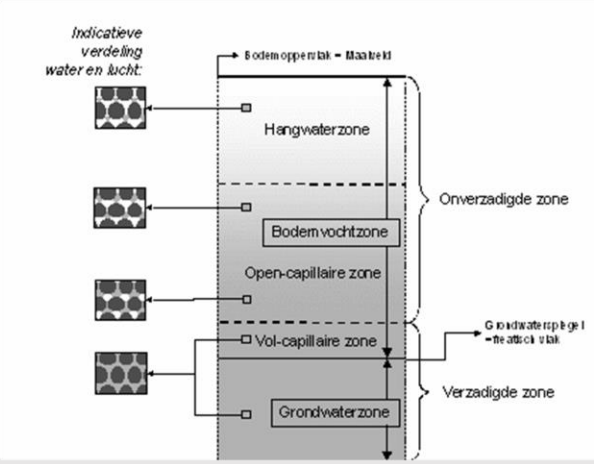
OVUR

Bestanddelen bodem



Nutriënt deficiëntie

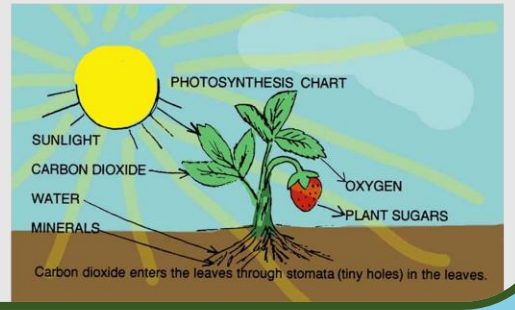
Waterhuishouding



Uitlopers

Doorteelt

Fotosynthese



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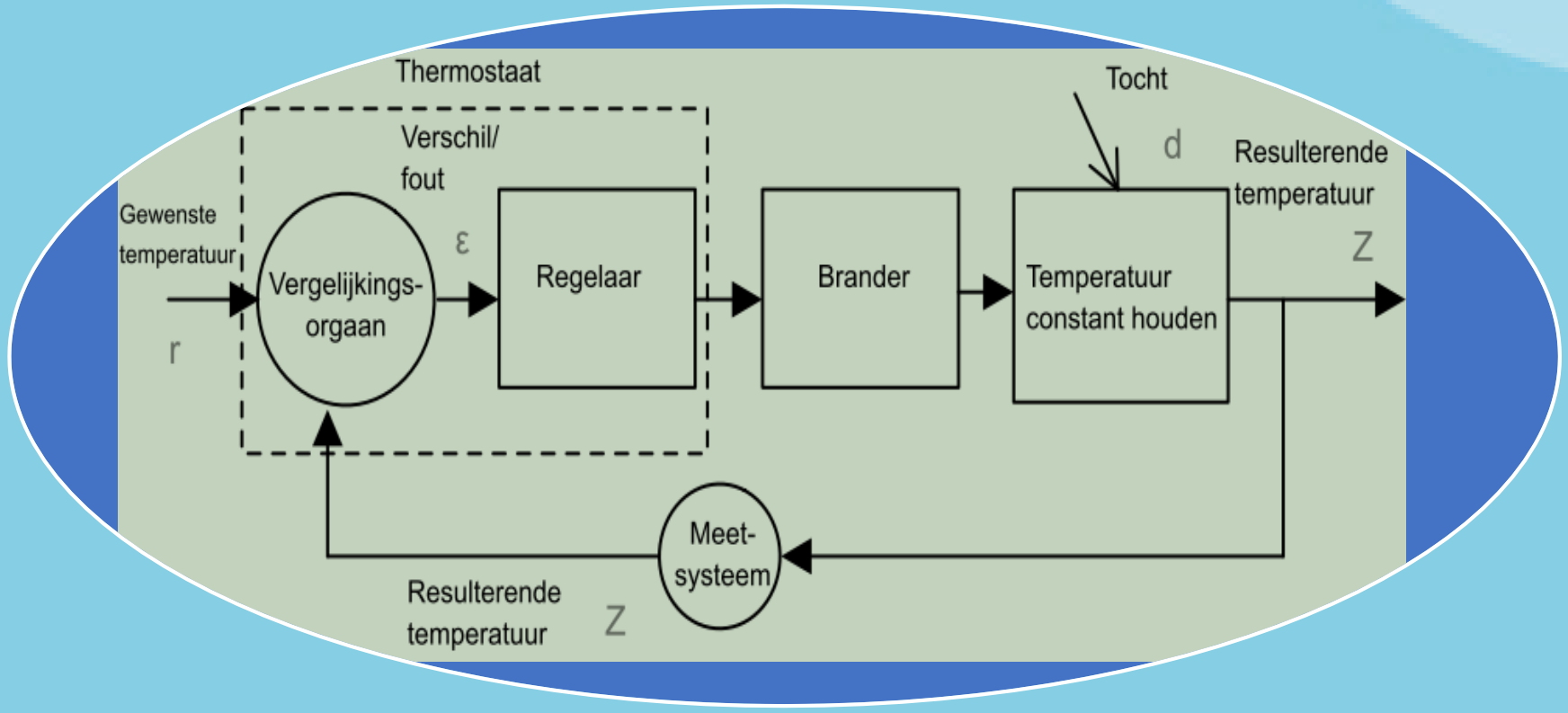
TECHNOLOGY ENGINEERING

- **Regeltechnieken**



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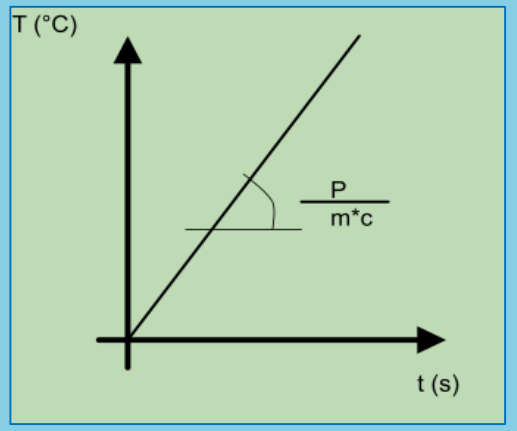
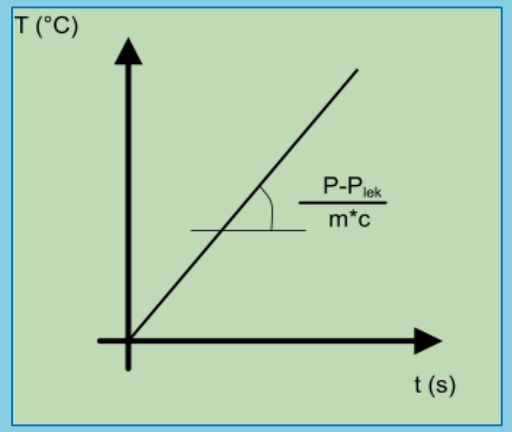
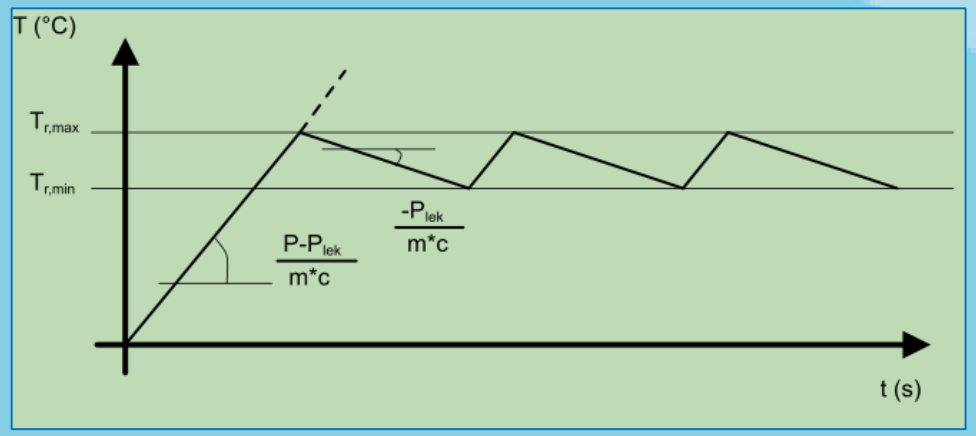
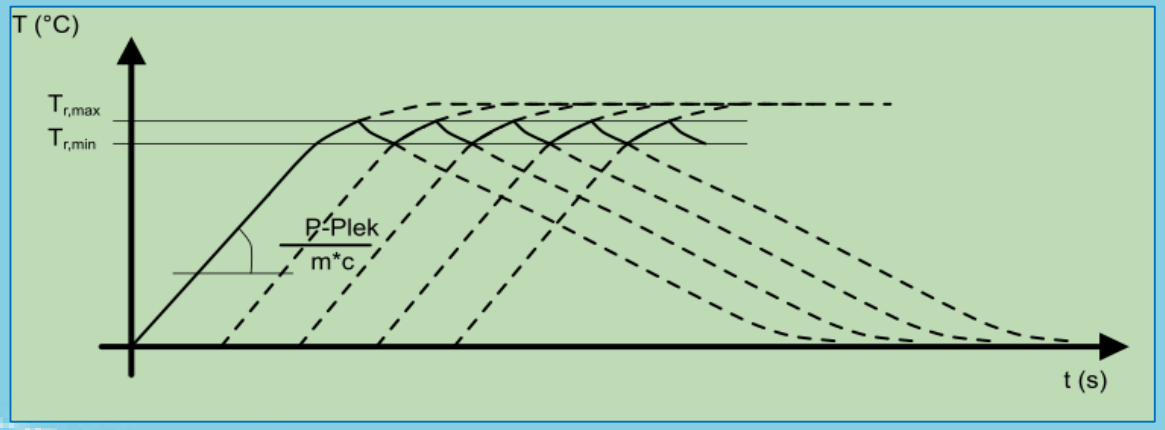
TECHNOLOGY ENGINEERING

Simulatie Excel









$$P_{lek} = \frac{T_{int} - T_{ext}}{R_{isolatie}}$$

$$T_{int} = \frac{\left(P - P_{lek,vorig}\right) \cdot \Delta t}{m \cdot c} + T_{vorig}$$

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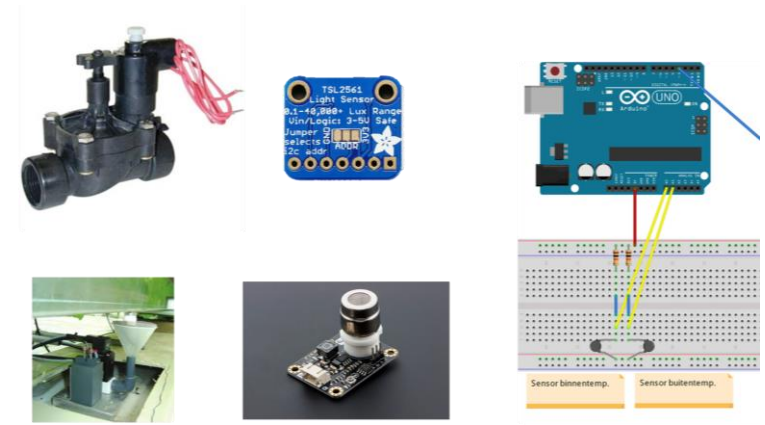
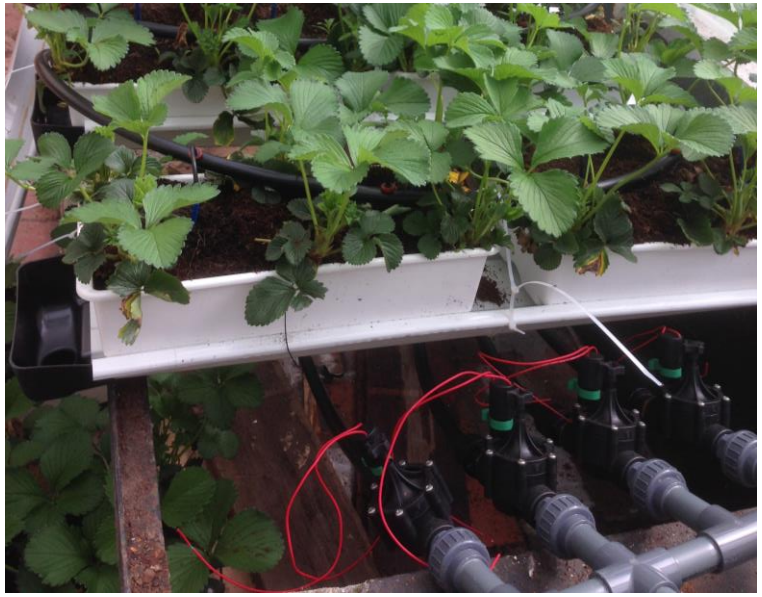
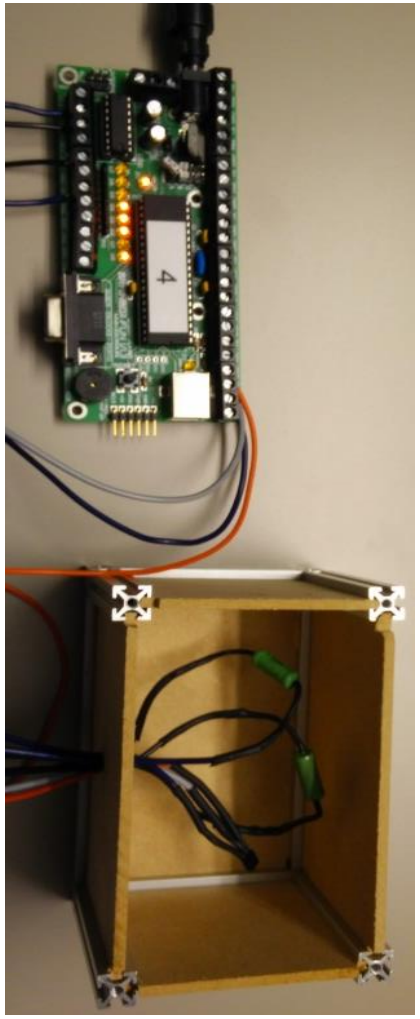
TECHNOLOGY ENGINEERING

- **Programmatie Arduino:**
- Sensoren: temperatuur, watergehalte, CO2, licht, bemesting.







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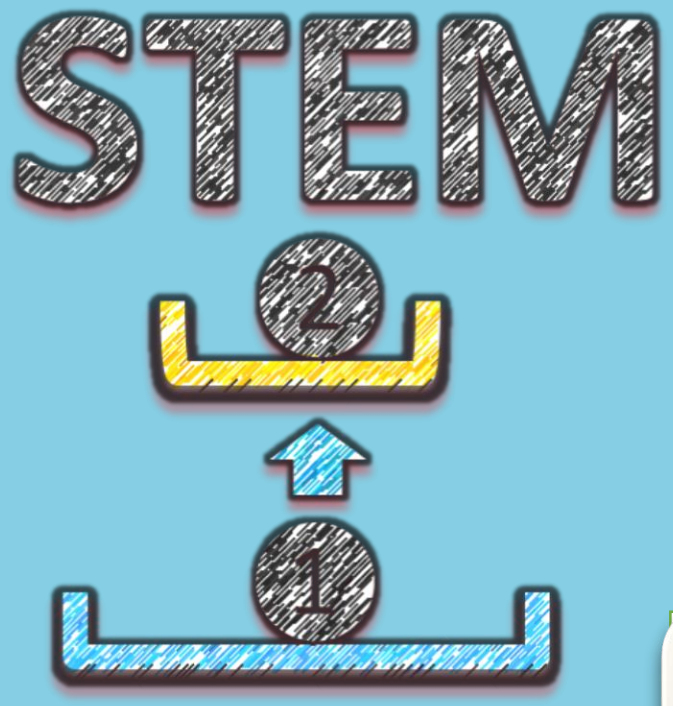
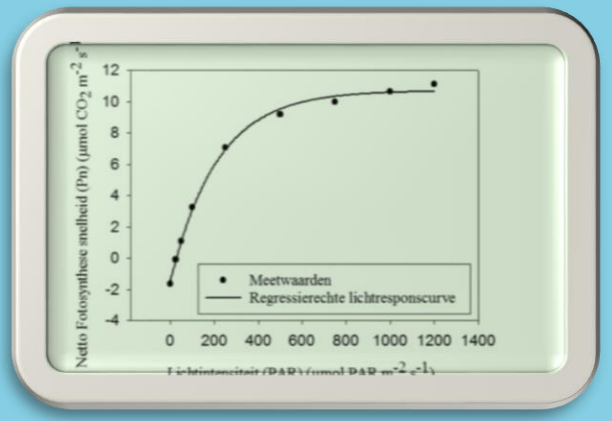
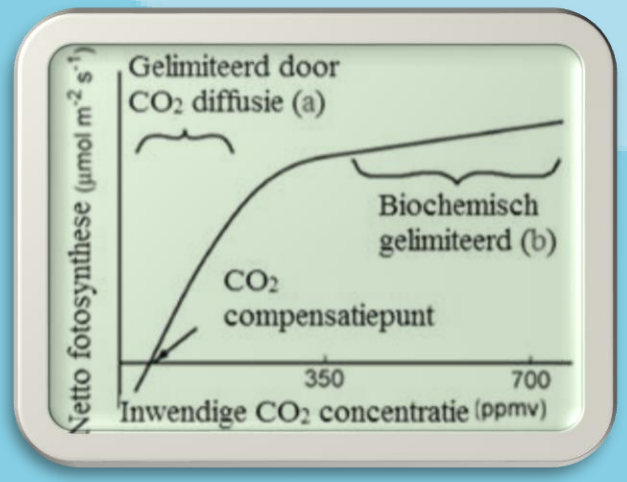
Opbrengstverhoging

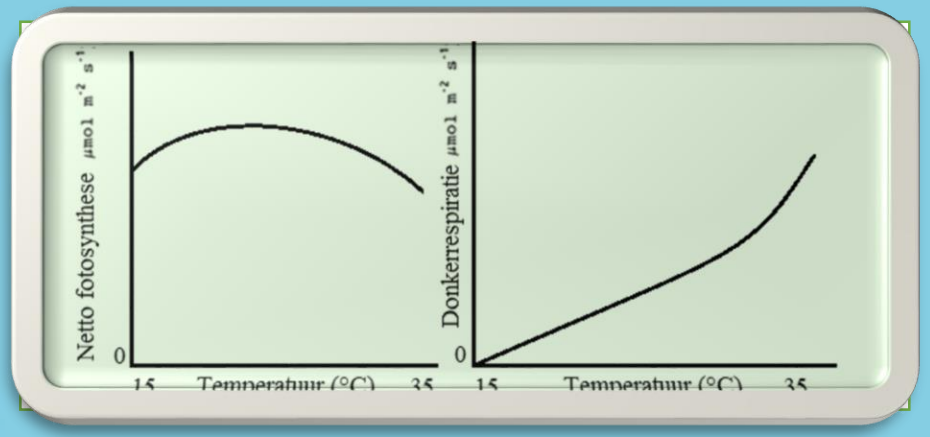
Datalogging

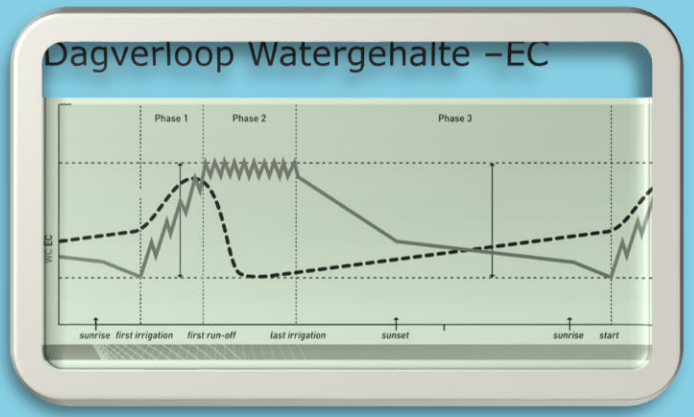
→Optimalisatie











Heilig Graf


Ruimte
Innovatief
Voorsprong
Geloven
Relatie
Welbevinden
Warme school
Structuur
Zorg


Enthousiast
Wakker
Diversiteit
Jong talent
Sportiviteit
Sociaal
Creativiteit


Participatief
Gedifferentieerd
Sterk merk
Betekenisvol
Actief